TANDY 6000

XENIX
Multiuser Operating System

READ ME FIRST

All computer software is subject to change, correction, or improvement as the manufacturer receives customer comments and experiences. Radio Shack has established a system to keep you immediately informed of any reported problems with this software, and the solutions. We have a customer service network including representatives in many Radio Shack Computer Centers, and a large group in Fort Worth, Texas, to help with any specific errors you may find in your use of the programs. We will also furnish information on any improvements or changes that are "cut in" on later production versions.

To take advantage of these services, you must do three things:

(1) Send in the postage-paid software registration card included in this manual immediately. (Postage must be affixed in Canada.)

(2) If you change your address, you must send us a change of address card (enclosed), listing your old address exactly as it is currently on file with us.

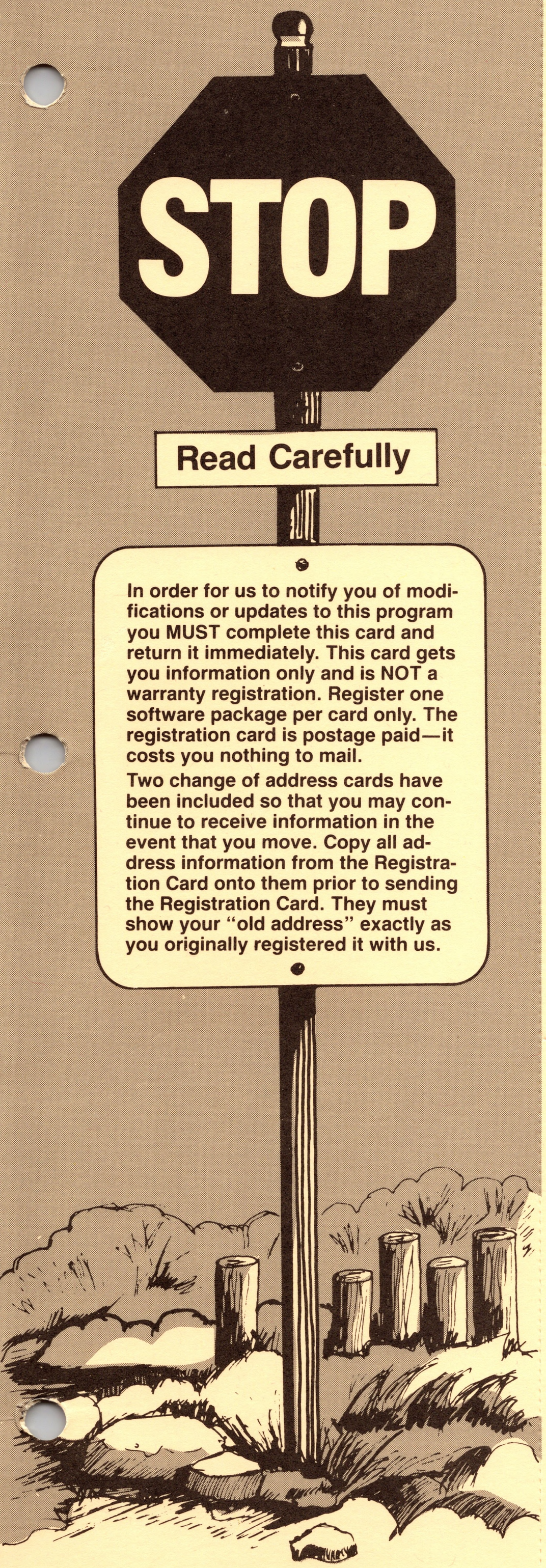
(3) As we furnish updates or "patches", and you update your software, you must keep an accurate record of the current version numbers on the logs below. (The version number will be furnished with each update.)

Keep this card in your manual at all times, and refer to the current version numbers when requesting information or help from us. Thank you.

APPLICATIONS SOFTWARE VERSION LOG

03.00.00		

OP. SYSTEM VERSION LOG



In order for us to notify you of modifications or updates to this program you MUST complete this card and return it immediately. This card gets you information only and is NOT a warranty registration. Register one software package per card only. The registration card is postage paid—it costs you nothing to mail.

Two change of address cards have been included so that you may continue to receive information in the event that you move. Copy all address information from the Registration Card onto them prior to sending the Registration Card. They must show your "old address" exactly as you originally registered it with us.

Software Registration Card

Cat. No. 7003030

Version 03.00.00

Name _____

Company _____

Address _____

City _____ Phone (____) ____ - _____

State _____ Zip _____

Change of address

NEW ADDRESS

Name _____

Company _____

Address _____

City _____ Phone (____) ____ - _____

State _____ Zip _____

OLD ADDRESS

Name _____

Company _____

Address _____

City _____ Phone (____) ____ - _____

State _____ Zip _____

Change of address

NEW ADDRESS

Name _____

Company _____

Address _____

City _____

State _____ Zip _____

OLD ADDRESS

Name _____

Company _____

Address _____

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State _____ Zip _____

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Software Registration
Data Processing Dept.
P.O. Box 2910
Fort Worth, Texas 76113-2910

Important Information About cu

Warning: Do not attempt to use the instructions on calling up cu in The User's Guide to XENIX. They are incorrect for this version of XENIX. Instead, use the instructions below.

calling up a manually connected system

At the system prompt, type:

cu wait -s baud rate -a /dev/null -l /dev/channel

The baud rate must be the same for both the sending and the receiving devices. The possible baud rates are:

3ØØ, 12ØØ, 96ØØ

/dev/null indicates that you are not connected via modem. **channel** is the serial channel to which the cable is connected at your terminal. If you are connected through Channel A, replace channel with ttyØ1; if you are connected through Channel B, replace channel with ttyØ2.

For example, if you are sending and receiving at 12ØØ baud and are connected through Channel B, type:

cu wait -s 12ØØ -a /dev/null -l /dev/ttyØ2 <ENTER>

calling up a remote system

If you are using a modem, you can call up another system and let XENIX identify the speed (baud rate) of your modem. To do so, you use the following command:

cu phonenumber -s speed

You can, however, select the dialout speed to your modem.

To select a dialout speed of 12ØØ baud (and 12ØØ baud only), type:

cu phonenumber -a /dev/cua#.12ØØ -s 12ØØ <ENTER>

phonenumber is the desired phone number. # is Ø if you are dialing out on ttyØ1; it is 1 if you are dialing out on ttyØ2.

To select a dialout speed of 3ØØ baud (and 3ØØ baud only), simply substitute 3ØØ for 12ØØ in the above command line.

You can use **cu** to transfer only ASCII files; you cannot transfer binary files with **cu**.

You may lose characters during a file transfer if your communication lines have noise. To correct this problem, you may need to place the call again or lower the baud rate.

For further information, see the section "using cu" in The User's Guide to XENIX.

Special Notes to Xenix 3.Ø Users

Formatting Your Hard Disk

At the top of page 12 of The System Administrator's Guide to XENIX, you are instructed to type **Ø <ENTER>** to indicate that you are formatting your first hard disk. After you do so, the screen shows:

Destructive or Non-destructive format (d or n)?

You are then instructed to type **d <ENTER>**. Be sure to follow these instructions exactly; that is, you must choose "destructive format." This assures that XENIX will write and verify the tracks on your hard disk in the proper manner.

You choose "non-destructive format" only when you are upgrading from a previous version of XENIX or when you are reformatting and your hard disk contains data that you want to save.

When formatting a new hard disk, always respond to this question by typing **d <ENTER>**.

Using Applications Programs with XENIX 3.Ø

Please read the information below if you plan to use any of the following applications or Xenix functions:

Multiplan™ Version Ø1.Ø6.ØØ (26-648Ø)
Unify® Version Ø1.ØØ.ØØ (26-6415)
Scripsit® 16 Version Ø1.ØØ.ØØ and Ø1.ØØ.Ø1 (26-6431)

If you are using one of the above applications with a DT-1ØØ, you must install a special DT-1ØØ file. To do so, follow these instructions:

1. Install the application as instructed in the application manual.

2. Type: **dt1ØØ-install <ENTER>**

3. At the DT-1ØØ Installation Menu, type:

   1 <ENTER>

   When prompted, insert the DT-1ØØ Installation diskette (Cat. No. 7ØØ-2Ø2Ø or 26-6Ø52) into Drive Ø.

All later versions of the above applications do not require any modification.

Profile® 16 (26-6412)

You must use Version Ø1.Ø1.ØØ (or later).

runcobol

A new version of **runcobol** is supplied with Xenix 3.Ø. It lets you use the <F1> and <F2> keys on the DT-1ØØ for the accounting applications.

Note: Some commands in the TRS-XENIX Development System (26Ø-64Ø1) may not work with XENIX 3.Ø. The XENIX Development System Upgrade (7ØØ-3Ø34), which works with XENIX 3.Ø, will be available soon.

File System Checking

fsck warns you if you attempt a file system check on a disk that was not formatted by Xenix 3.Ø. This is a warning only. You may also see the following prompts:

```
FREE INODE COUNT WRONG IN SUPERBLK
FIX?

FREE BLK COUNT WRONG IN SUPERBLK
FIX
```

Answer **y <ENTER>** to these prompts to proceed. (Note: The Install disks for Xenix 3.Ø are formatted in Microsoft Xenix 2.3 format.)

Terminal Printing

The **lpr** command has 2 new options:

-F ["p=size of form"] [x]
Forms Option for Local Print (only). The **"p="** option sets the size of the form on which you wish to print. It does so in number of lines (6 lines = 1 inch). For example, to print on a form that is 33 lines long, set "p=33". This does not mean that you actually print 33 lines of text on the form. The line printer prints whatever you have specified and then goes to the top of the next form. From the top of the form to the bottom is 33 lines.

Form length defaults to 66 lines. In other words, if you do not specify a form length, XENIX assumes your form is 66 lines from perforation to perforation.

Note: You use the forms option primarily to print forms such as checks or invoices. It is not a paginating device and will not work as such.

The **x** option specifies transparent mode for **lpr**. In transparent mode, **lpr** sends all data directly to the printer without translation or interpretation. The options "**p=** and **x** are mutually exclusive; only one can be used on a line. Transparent mode defaults off.

-T [type]
Printer Type. Tells **lpr** where to send data intended for the printer. Type may include one of the following:

spooler tells **lpr** to send all data to the system spooler. It is printed on the system printer when it is available. Type defaults to spooler.

local tells **lpr** to send all data to the printer connected to your terminal if available.

live = device type is provided for applications requiring interactive printing capabilities. (Example: live=/dev/clp)

You can use the **export** command to set new defaults for these options:

PRINTER=type;export PRINTER
or
FORMS="p=page length";export FORMS

For example:

PRINTER=local;export PRINTER

sets the printer to the terminal's printer.

FORMS="p=33"; export FORMS

sets the forms option to 33 lines per page.

Note: You can add these commands to a user's **.profile** file. For example, adding **PRINTER=local;export PRINTER** lets the user print locally as soon as the user logs in to the system.

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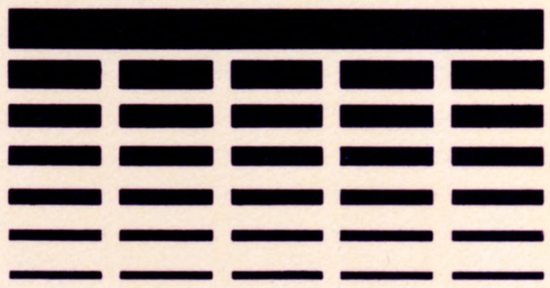
For further information, see the section "using cu" in The System Administrator's Guide to XENIX.

introducing your

TANDY

- 6000 -



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8/84

introducing your Tandy 6000

Introducing Your Tandy 6000
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XENIX™ is a trademark of Microsoft Corporation.

The Input/Output circuitry of the Tandy 6000 is covered by U.S. Patent No. 4,468,753.

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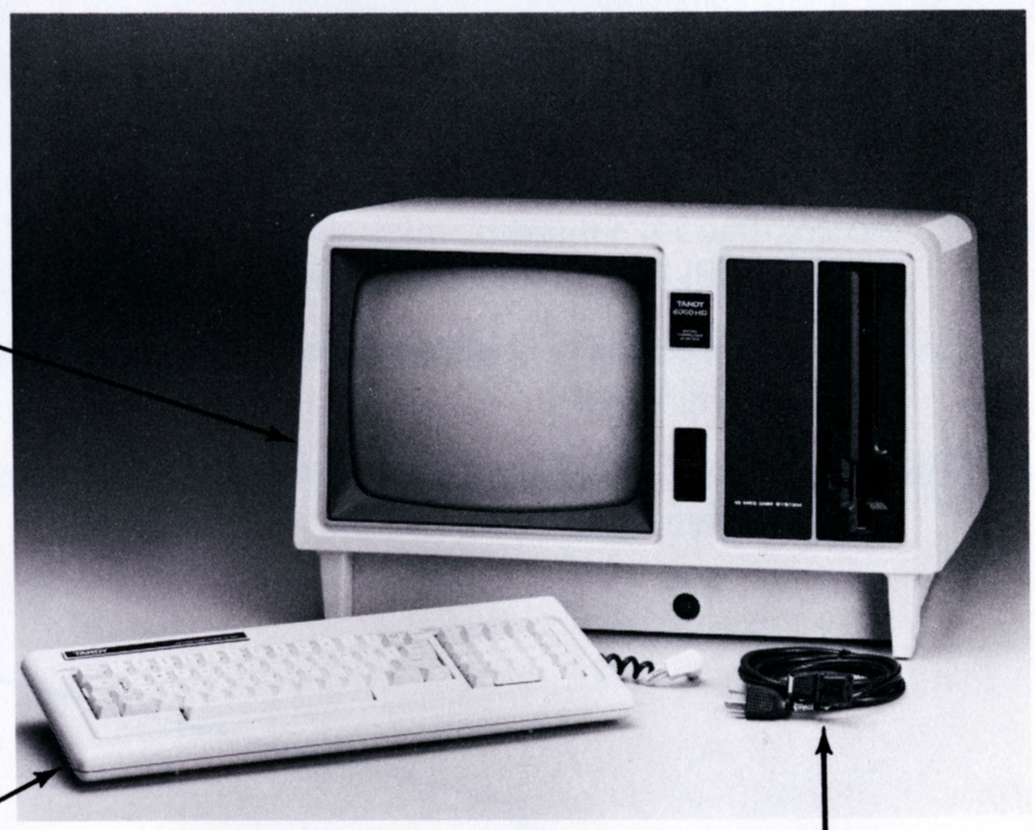
your equipment

Tandy 6000

Tandy 6000 HD

Carefully unpack the Tandy 6000 computer, and be sure you have the following items:

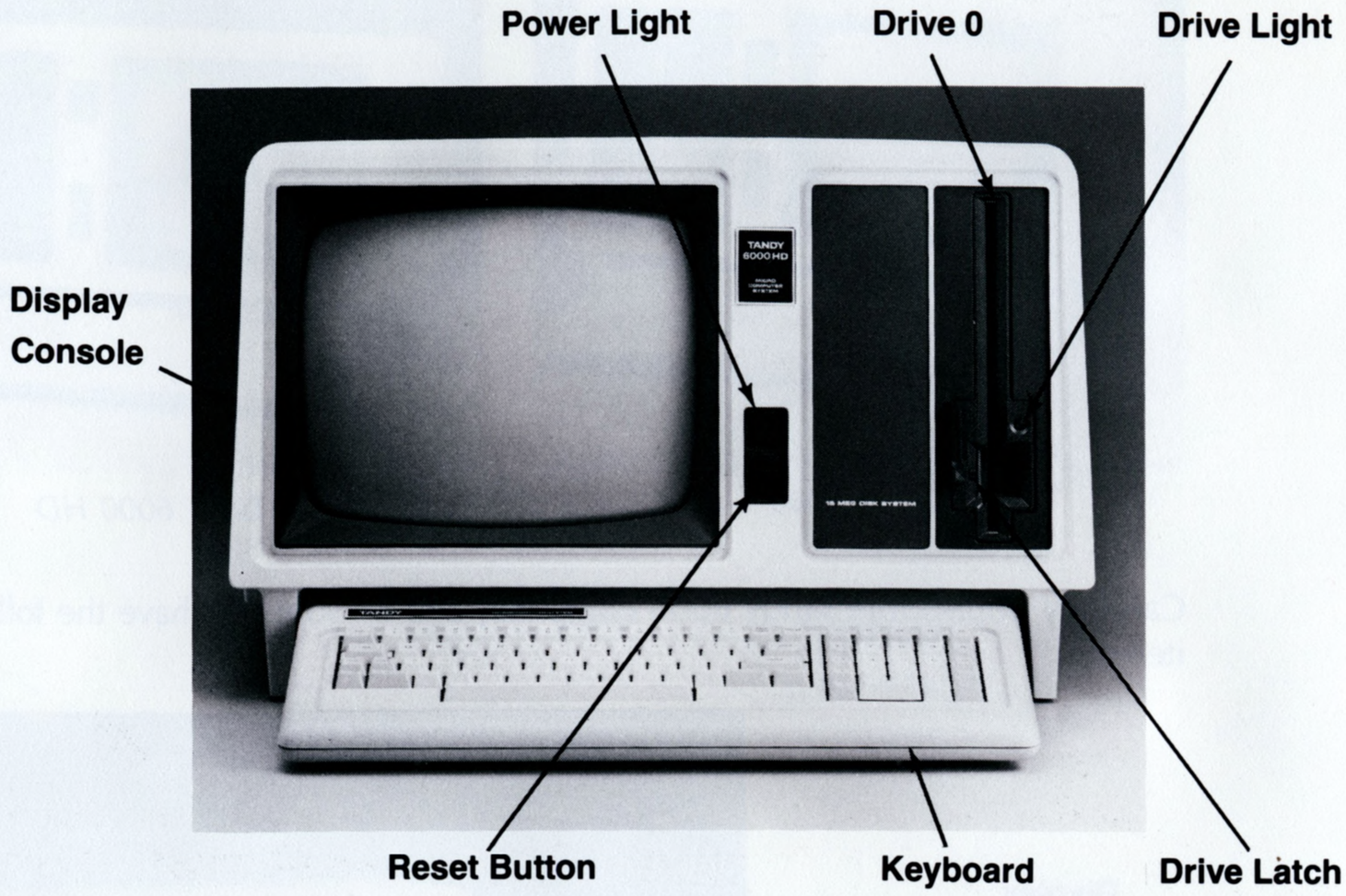


Your Tandy 6000 package also includes the XENIX™ operating System. This system must be installed on a hard disk.

If you have a Tandy 6000, you must add a hard disk to install and use XENIX. Instructions for connecting a hard disk to the Tandy 6000 follow in this manual.

If you have a Tandy 6000 HD, your computer has a built-in 15-megabyte hard disk on which you may install XENIX. After reading this manual, follow the instructions in *The System Administrator's Guide to XENIX* to install the operating system.

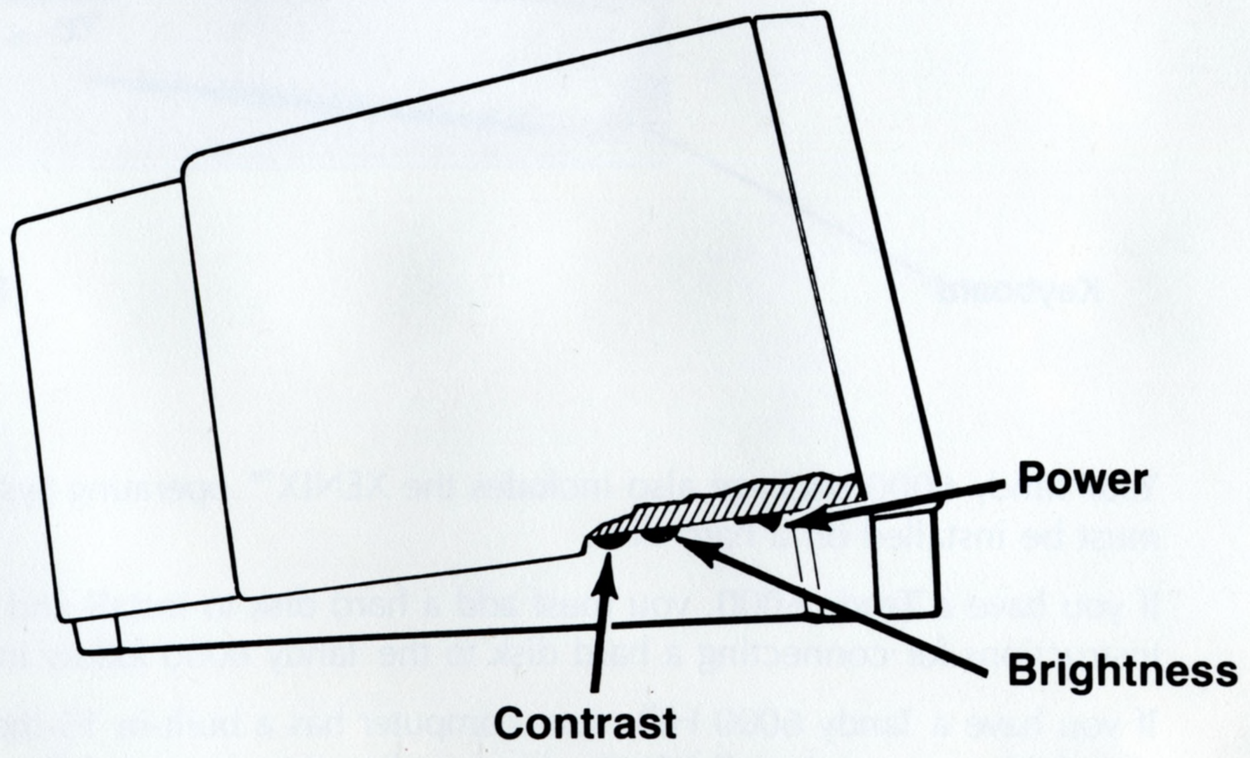
Note: Disk media flaws on the Tandy 6000 HD hard disk unit are identified before the hard disk is installed in the unit. Attached to the inside of the access panel on the back of your display console is a MEDIA ERROR MAP that specifies the flawed locations on your particular unit. **Do not throw this error map away!** You need to refer to it when formatting the hard disk, and Tandy Computer service technicians may need to refer to it if your drive ever needs servicing.

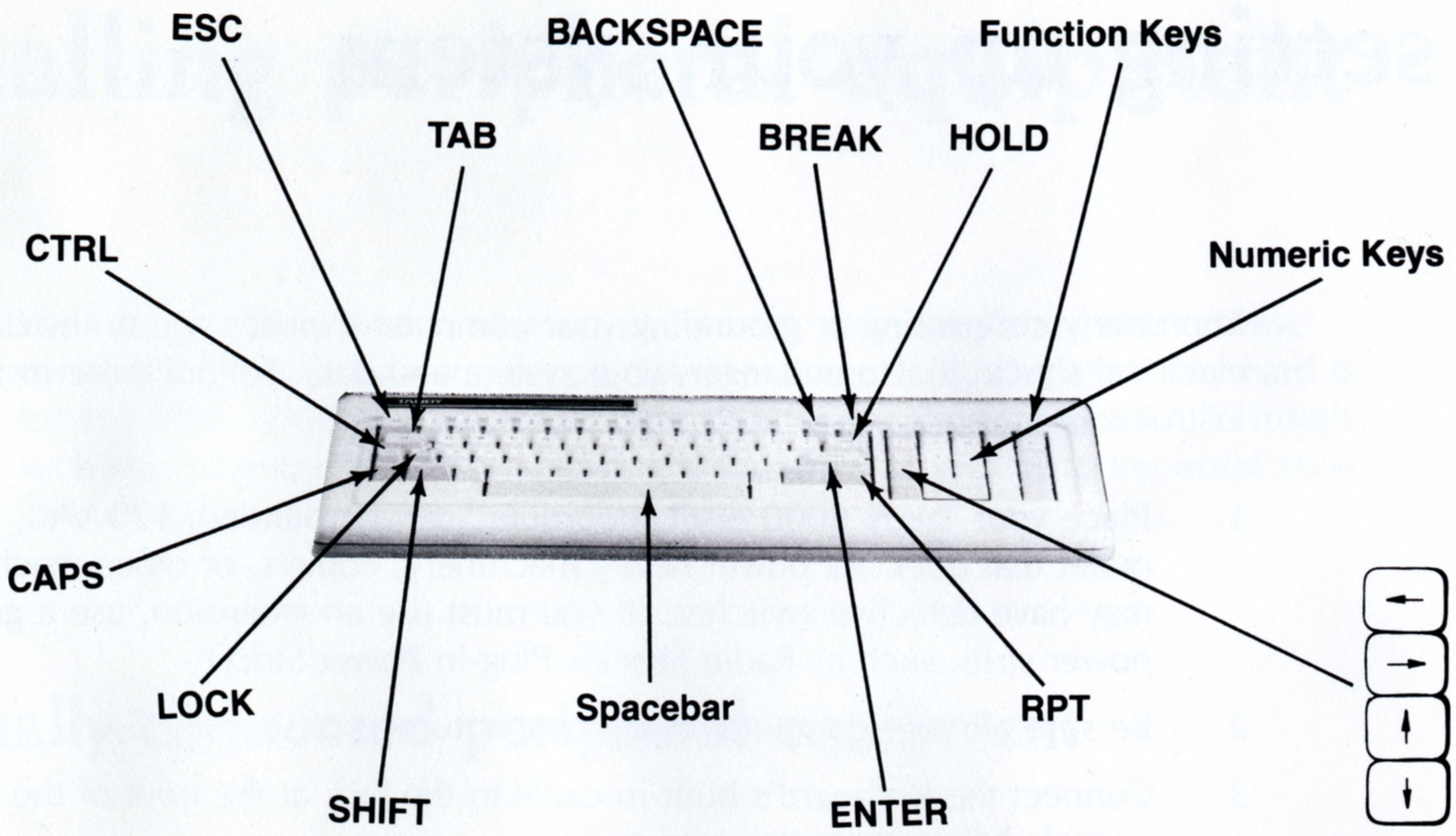


RESET BUTTON—Repeats the power-up sequence.

POWER LIGHT—Lights when the system's power is on. Never move the unit when this light is on.

DRIVE LIGHT—Lights when the drive is active. **Never remove a diskette when a disk drive light is on.**





CAPS — When the CAPS light is on, the keyboard produces only capital letters for the alphabet keys. CAPS does not affect other keys. Press CAPS once to activate caps-only mode; press again to return to normal mode.

SHIFT, LOCK — Lets you type capital letters and shifted punctuation symbols. Hold down SHIFT while pressing the desired key, or press LOCK once (the red light comes on). When LOCK is activated, your computer recognizes only shifted characters. To release LOCK, press SHIFT.

RPT — Repeats a character continuously when held down at the same time as another key.

Note: The numeric keypad keys are not affected by CAPS, SHIFT, or LOCK keys.

setting up your system

Improperly connecting or grounding your computer exposes you to the danger of electrical shock. It also endangers your system and data. Follow these installation instructions carefully:

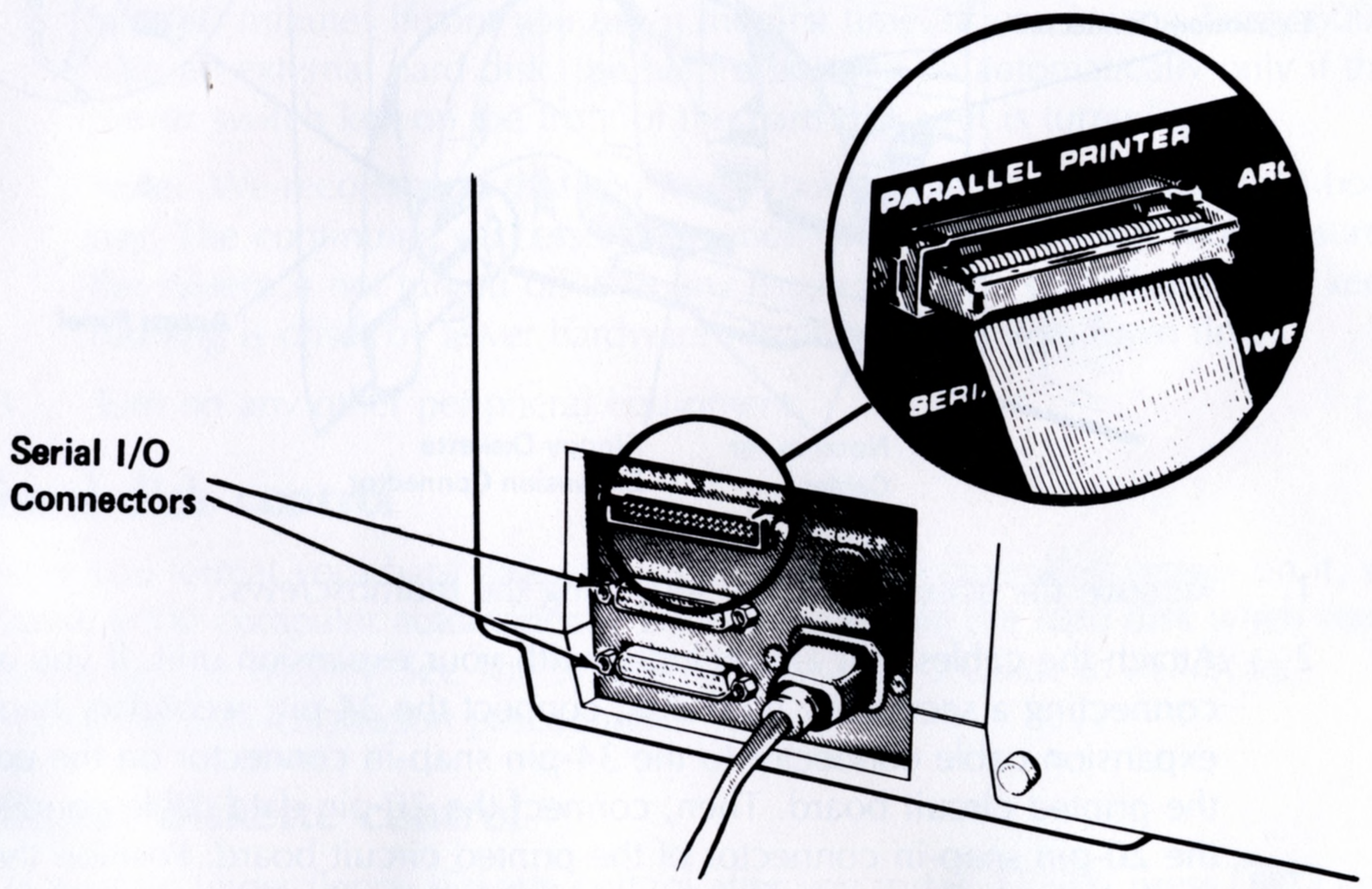
1. Place your Tandy 6000 display console near a grounded, 120 VAC, 3-prong outlet that does not power heavy machinery, copiers, or office machines that may have defective switches. (If you must use an extension, use a grounded power strip, such as Radio Shack's Plug-In Power Strip.)
2. Be sure all your computer equipment is turned off.
3. Connect the keyboard's built-in cable to the jack at the front of the computer console below the video screen.

4. Plug the power cord into the back of the display console.
5. Plug the power cord into the outlet or grounded power strip specified in Step 1.

installing peripheral equipment

You can use other Tandy computer equipment with your Tandy 6000. These peripherals include printers, floppy disk expansion units, and a primary hard disk for the Tandy 6000 or a secondary hard disk for the Tandy 6000 HD. To install such equipment, refer to the following instructions as well as to the installation instructions supplied with the equipment.

externally connected peripheral equipment



External Peripheral Equipment Connections.

PARALLEL PRINTER CONNECTOR—Used to connect Tandy parallel printers. Be sure that the printer cable exits the bottom of the connector.

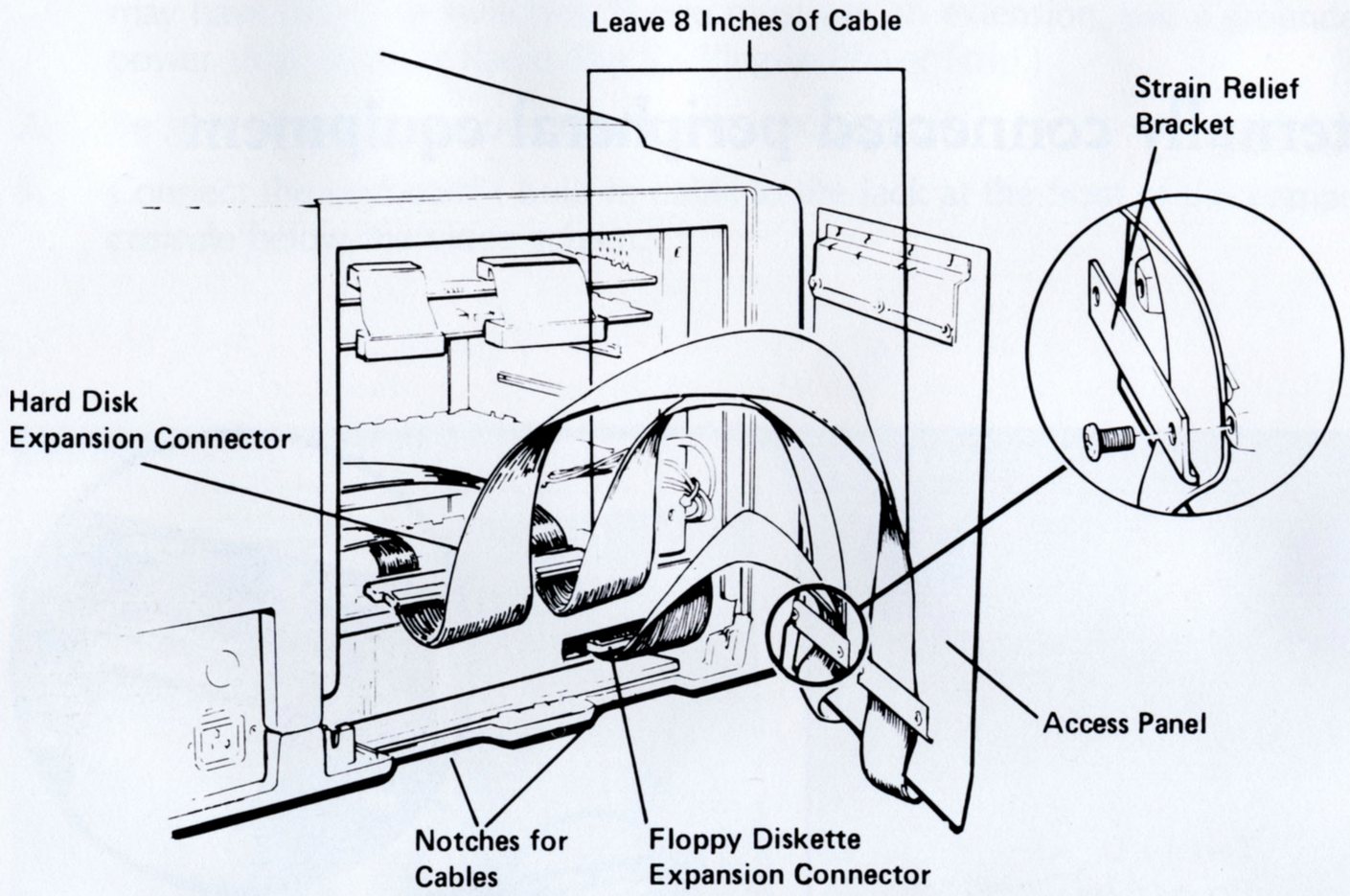
SERIAL I/O CONNECTOR—Used to install serial equipment such as serial line printers, modems, and data terminals. If you have a Tandy 6000 HD, you must connect a DB-25 cable to the Serial I/O Connector on the back of the unit.

internally connected peripheral equipment

The floppy disk and hard disk expansion connectors are behind the Input/Output access panel on the back of the Tandy 6000 computer.

FLOPPY DISK EXPANSION CONNECTOR—Used to add floppy diskette storage devices such as the Thinline Disk Bay. (Instructions for connecting the cable follow the illustration below.)

TANDY 6000 HD SECONDARY HARD DISK CONNECTOR—Used to add an optional secondary hard disk to your system's built-in hard disk. (Instructions for connecting the cable follow the illustration below.)



1. Remove the access panel by loosening the thumbscrews.
2. Attach the cables that are included with your expansion unit. If you are connecting a secondary hard disk, connect the 34-pin secondary hard disk expansion cable connector to the 34-pin snap-in connector on the edge of the printed circuit board. Then, connect the 20-pin data cable connector to the 20-pin snap-in connector of the printed circuit board. Position the built-in hard disk connectors so that the cables exit from the bottom.

   If you are connecting a floppy disk expansion unit to the Tandy 6000, attach the connector on one end of the cable to the 50-pin connector on the chassis. Connect the other end of the cable to the expansion unit.
3. Remove the strain relief brackets from the access panel. Run each cable downward through the nearest strain relief, leaving about 8 inches of cable between the strain relief and the computer.
4. Replace the strain relief brackets, and run the cable through the slot in the base of the display console.
5. Replace the access panel and tighten the thumbscrews.

   Note: Your system's hard disk drives must always contain a line terminator. Check with your Tandy Computer Center for details.

power up/power down

Always turn your Tandy 6000 computer on and off exactly as described in this chapter. Changes in the sequence might damage the system and data.

You can use your Tandy 6000 in two ways: under hard disk control or under floppy diskette control.

Until you install an operating system on your hard disk however, you must operate under floppy diskette control.

powering up the system

1. Be sure that all disk drives are empty and all equipment is off.
2. Turn on the system by pressing the power switch on the lower left side of the display console. This automatically turns on all built-in hard and floppy drives. If you have the Tandy 6000 HD, allow the hard disk to warm up for at least 30 minutes before you use it the first time. (If you have a Tandy 6000 with an external hard disk, the hard disk turns on automatically only if the power switch key on the front of the hard disk unit is turned on.)

   Note: We recommend that you leave your system up and running 24 hours a day. The continuing successful operation of your hardware is more assured if the system is not turned off with any frequency. The cost of power to keep it running is offset by fewer hardware repair bills and less down time.
3. Turn on any other peripheral equipment.

hard disk control

After you format your hard disk and install the XENIX operating system on it, your Tandy 6000 computer automatically boots XENIX from the hard disk when you power up the system. (See *The System Administrator's Guide to XENIX* for formatting and installation procedures.)

floppy diskette control

To operate under floppy diskette control after you install XENIX, press [RPT] and [BREAK] simultaneously during the "white-out" of the video display. The screen displays the following message:

INSERT DISKETTE

If this message does not appear, try the following:

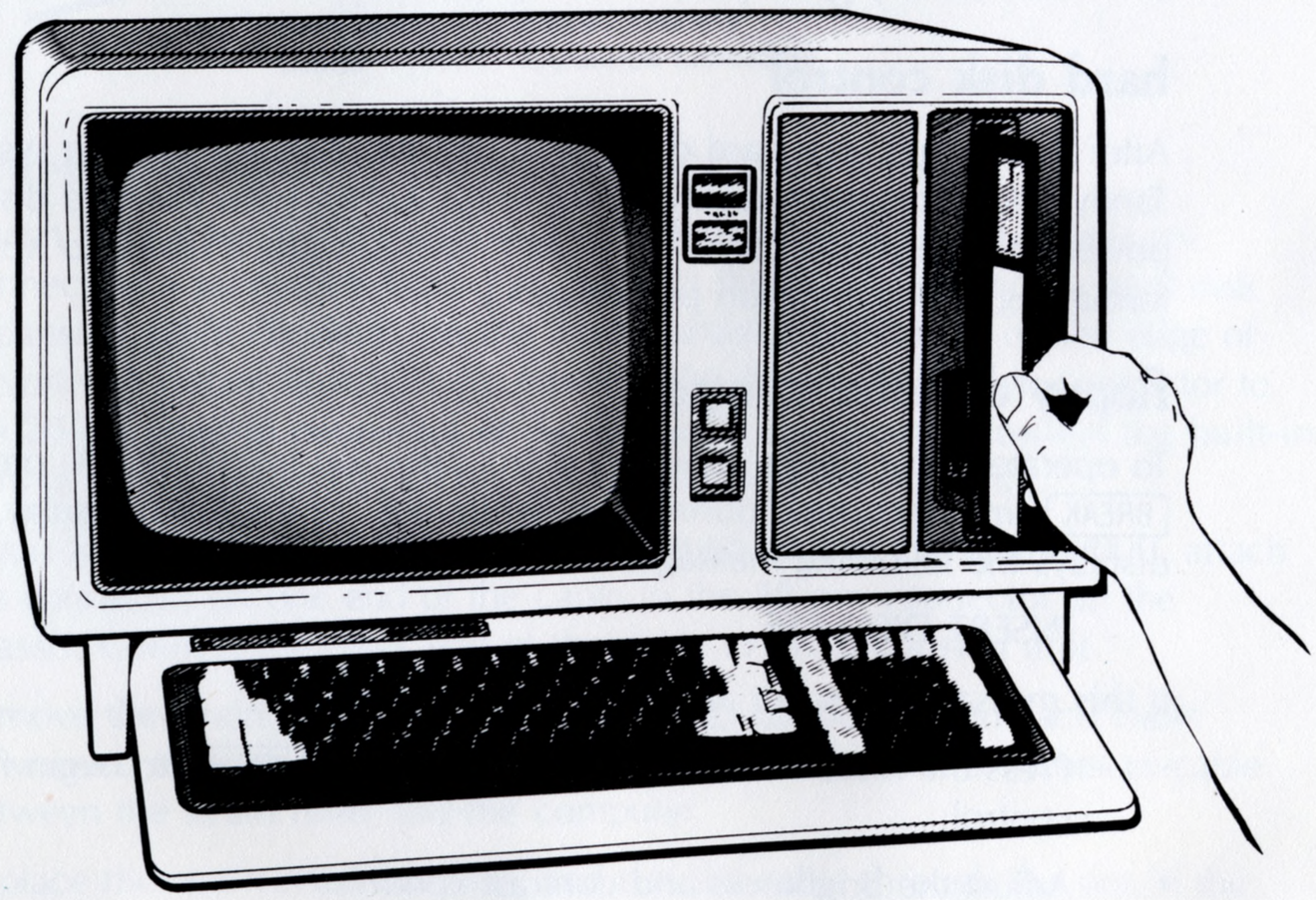
- Press the reset button, and then press [RPT] [BREAK] to begin floppy diskette control.
- Adjust the brightness and contrast controls.
- Turn off all peripherals, and then turn off the computer. Check all connections to and from the peripherals.

After the screen displays the INSERT DISKETTE prompt, turn on your system's peripheral equipment.

To insert a floppy diskette:

1. Power up your Tandy 6000 computer, and press RPT BREAK. Be sure the drive latch is in the vertical position.

2. When the screen shows the INSERT DISKETTE message, carefully insert a diskette into floppy Drive 0 with the label facing the display screen. (On the Tandy 6000, the floppy drive on the left is Drive 0.) Push the diskette into the slot until it locks into place.



3. Turn the latch clockwise until it locks into a horizontal position.

   Warning: Never turn the computer on or off when a diskette is in a drive. Doing so can destroy the data on the diskette.

To remove a floppy diskette:

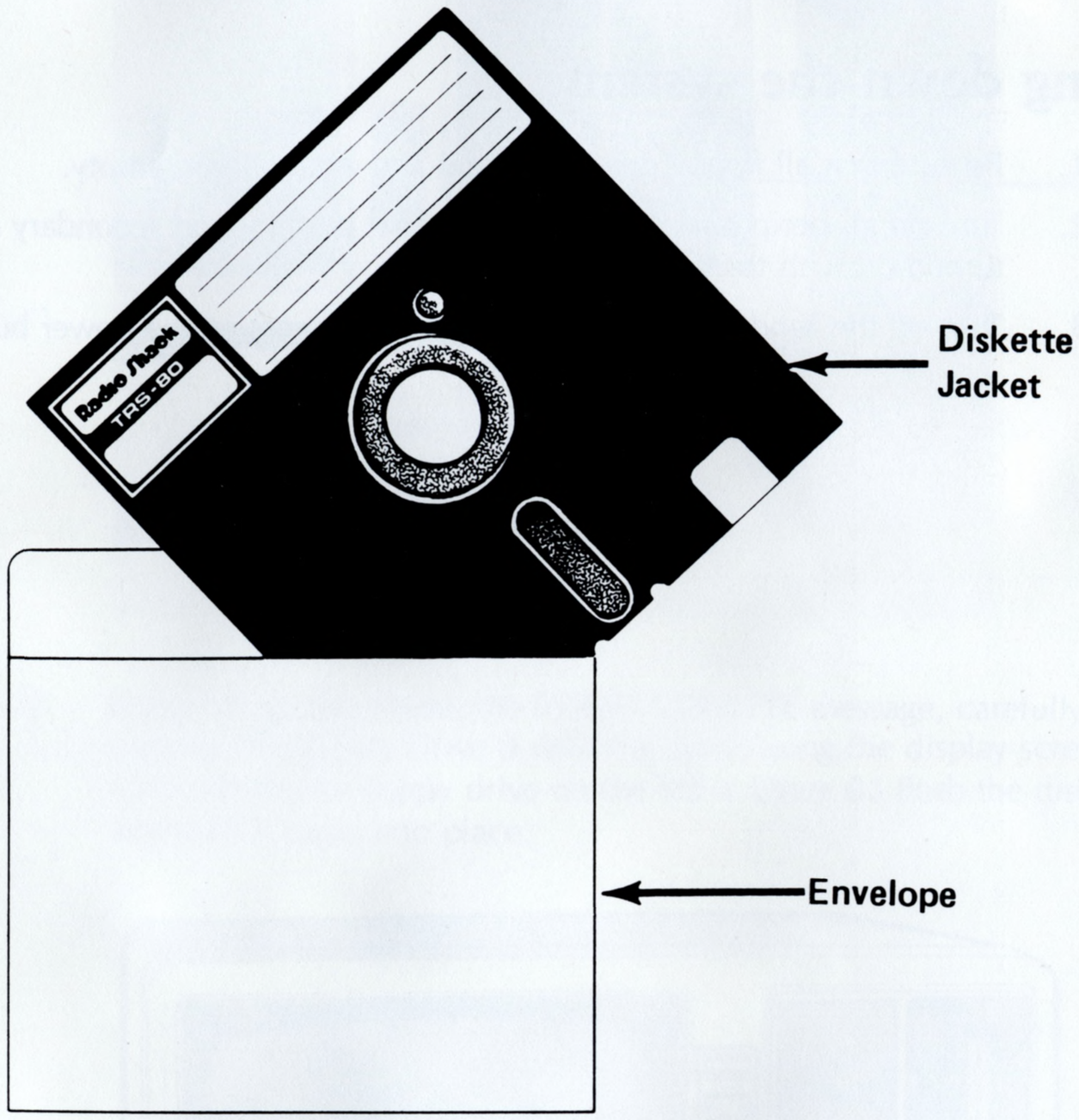
1. Be sure the drive light is off. **Never remove a diskette when the drive light is on.**
2. Turn the drive latch counterclockwise until it is in the vertical position. The diskette pops partially out of the drive.
3. Carefully remove the diskette from the drive, making sure its shiny surface does not touch anything. Return the diskette to its storage envelope.

powering down the system

1. Be sure that all floppy drives (internal and external) are empty.
2. Turn off all peripheral equipment. External primary and secondary drives are turned off with the computer.
3. Turn off the Tandy 6000 computer system by pressing the power button.

maintenance

care of floppy diskettes



Handle floppy diskettes carefully. A scratch or small indentation or even a speck of dust could destroy some or all of the data on a diskette.

To protect your diskettes (and the information they contain) from accidental damage, follow these guidelines:

- Never turn on your computer system while a diskette is in a drive.
- Store diskettes in their envelopes, making certain that there is no pressure on their sides.
- Keep diskettes away from magnetic fields (such as transformers, AC motors, magnets, TVs, radios, and the computer system's display console).
- Don't bend diskettes.
- Never touch a diskette's shiny exposed surface. Never try to wipe or clean the shiny disk surface—it scratches easily.
- Keep diskettes out of direct sunlight and away from heat.

- Keep diskettes away from cigarette ashes, dust, and other particles. In dusty areas, use filters to clean the air in the computer room.
- Don't write on the diskette label with a hard point pen or lead pencil. Use only a soft felt-tip pen.

floppy disk drive maintenance

Your computer's floppy disk drives need periodic care to prevent damage to your diskettes. Be sure to have your floppy disk drives checked every 6 months.

Ask a Radio Shack Computer Center sales representative about disk drive head cleaning kits.

hard disk drive maintenance

Hard disk drives don't require the same maintenance as floppy disk drives, but they do require special care. For example, never move or jar external hard disk drives while they are powered up. (Never move the Tandy 6000 HD display console while the unit is on.)

Be sure that the air around your hard disk is as free of dust and other particles as possible, and that the intake and output cooling vents are unobstructed.

If you have external hard disk drives, be sure to periodically clean the filter on the back of the unit. Carefully remove the outer grill. DO NOT REMOVE THE SCREWS. Remove the filter and rinse with tap water. When the filter is completely dry, put it back in the drive.

SPECIFICATIONS

Processors

INPUT/OUTPUT PROCESSOR SYSTEM

- Z80-A based with 64K bytes of random access memory
- Independent bus can support all the standard system boards
- Floppy disk mode lets you run programs previously developed for the Model II and Model 12 without changing them first

COMPUTATIONAL PROCESSOR SYSTEM

- 68000 based with either 512K or 1 megabyte of RAM
- Independent bus can support multiple bus masters

The 2 processors share the computing load from the applications programs (the Z80-A based processor performs input/output tasks while the 68000 based processor performs computational tasks).

Video Display

LSI CONTROLLER CHIP

Frees the input/output (Z80-A based) processor for much of the overhead required to update and maintain the video display.

FOUR MODES

- Green/white on black (normal)
- Black on green/white (reversed)
- 80 characters by 24 lines
- 40 characters by 24 lines

DISPLAYABLE CHARACTERS

- Full ASCII set
- 32 graphics characters

Keyboard

- LSI Controller frees the input/output (Z80-A based) processor from keyboard scan and related tasks
- Located in a separate case for convenience
- The Tandy 6000/6000 HD computer connects to the display console via a built-in, coiled cord that exits beneath the keyboard

- Standard typewriter keys, repeat key, and 8 general-purpose function keys
- Four modes with the following priority (highest to lowest):
  1. Unshift
  2. Shift
  3. Caps
  4. Control

Floppy Disk Drives

MINIMUM

Tandy 6000 HD

- One built-in 8-inch, double-sided floppy disk drive

Tandy 6000

- Two built-in, 8-inch, double-sided floppy disk drives

MAXIMUM

Tandy 6000 HD

- One built-in and a maximum of 2 external, 8-inch, double-sided floppy disk drives (floppy disk expansion unit needed for 2 external drives)

Tandy 6000

- Two built-in and a maximum of 2 external, 8-inch, double-sided floppy disk drives (floppy disk expansion unit needed for 2 external drives)

PREVENTIVE MAINTENANCE INTERVAL

- Typical usage (3,000 power-on hours per year): Every 8000 power-on hours
- Heavy usage (8,000 power-on hours per year): Every 5000 power-on hours

REQUIRED MEDIA

- Tandy double-sided, 8-inch floppy diskettes

  Data Transfer Rate is 500,000 bits per second (except Track 0, which has 250,000 bps).

  Diskette life is 3.5 million passes per track. To prevent limiting life by improper handling, follow diskette-care recommendations.

Power Supply

POWER REQUIREMENTS

- 105 - 130 VAC, 60 Hz
- 240 VAC, 50 Hz (Australian)
- 220 VAC, 50 Hz (European)
- Grounded outlet

MAXIMUM CURRENT DRAIN

- 2.1 amps

TYPICAL CURRENT DRAIN

- 1.6 amps

WARM-UP PERIOD

- 30 minutes (first time)
  15 seconds thereafter

Operating Temperature

- 55 to 85 degrees Fahrenheit
- 13 to 29 degrees Celsius

Peripheral Interfaces

STANDARD

- Serial port A (RS-232C)
- Serial port B (RS-232C)
- Parallel input/output channel, for connection to Tandy standard parallel interface line printers
- Floppy diskette input/output channel for connection of a floppy diskette expansion unit
- Hard disk drive interface (Tandy 6000 HD only)

OPTIONAL

- ARCNET interface
- Graphics Board

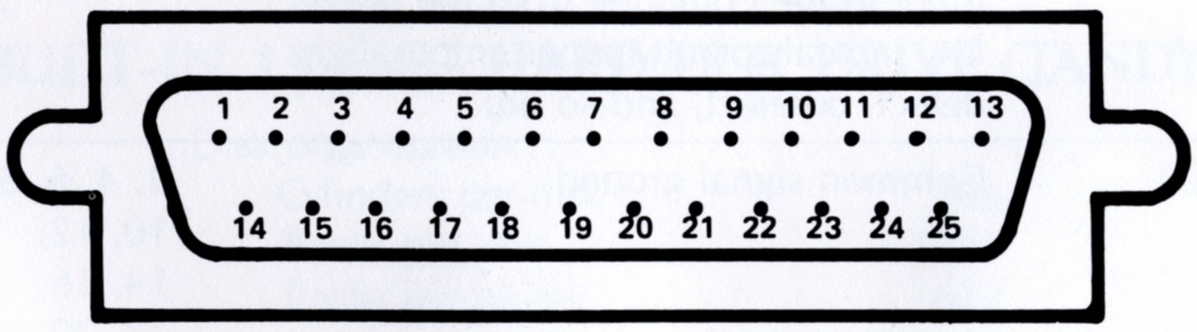
SERIAL INTERFACE

Two Ports

- Channel A allows asynchronous or synchronous transmission
- Channel B allows asynchronous transmission only
- Both conform to the RS-232C standard
- Both use the DB-25 connectors on the back of the display console

The DB-25 connector pin-outs and signals available are listed below.

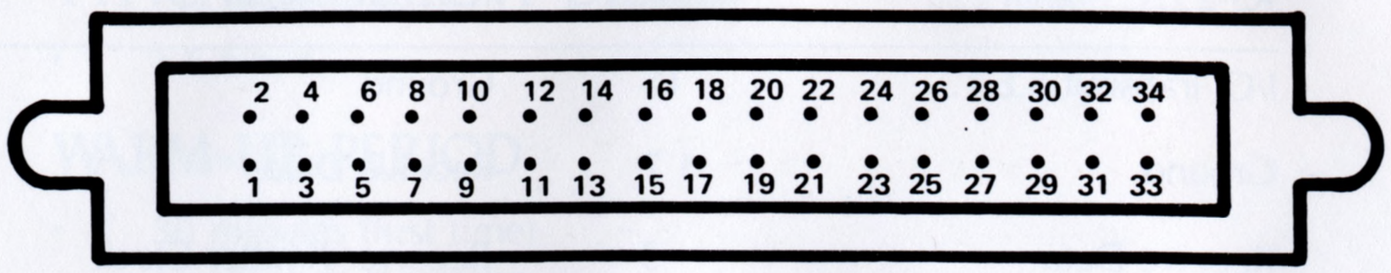
Channel A Standard RS-232C Signal	Pin #	Channel B Standard RS-232C Signal	Pin #
I/O Transmit S.E.T.	15	Ground	1,7
Ground	1 7	Receive Data	3
Receive Data	3	Receiver Xmitter Clock	17
Receiver Clock	17	Data Set Ready	6
Transmit Clock	24	Clear-to-Send	5
Data Set Ready	6	Carrier Detect	8
Clear-to-Send	5	Transmit Data	2
Carrier Detect	8	Request-to-Send	4
Transmit Data	2	Data Terminal Ready	20
Request-to-Send	4		
Data Terminal Ready	20		



PARALLEL INTERFACE

- Connection to a line printer via the 34-pin connector on the back panel of the display console
- Eight data bits are output in parallel
- Four data bits are input
- All levels are TTL compatible

The connector pin-outs and signals available are listed below.



Signal	Function	Pin #
ACK	Input to the computer from the printer; low indicates data byte is received	19
BUSY	Input to the computer from the printer; high indicates busy	21
PAPER EMPTY	Input to the computer from the printer; high indicates no paper—if the printer doesn't provide this, the signal is forced low	23
BUSY*	Input to the computer from the printer; low indicates device is selected	25
PRIME*	Output to the printer to clear the buffer; reset the printer logic	26
FAULT*	Input to the computer from the printer; low indicates fault (paper empty, light detect, deselect, and so on)	28
GROUND	Common signal ground	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 27, 31, 33
NC	Not connected	29, 30, 32, 34

*These signals are active-low.

EXTERNAL SECONDARY 15-MEGABYTE HARD DISK POWER REQUIREMENTS (TANDY 6000 HD)

AC Power Requirements

50/60 Hz ± 0.5 Hz
100/115 VAC installations (90 to 127V at 1.1A typical)
200/230 VAC installations (100 to 253V at 0.6A typical)

15-MEG DISK CHARACTERISTICS

No. of cylinders	306
No. of heads	6
Track access time	3msec
Data Transfer Rate	5.0MB/sec

15-MEG DIMENSIONS (CASE)

Height	5.5" (140 MM)
Width	14" (356 mm)
Depth	15" (381 mm)
Weight	15.5 lbs. (7.02 kg)

ENVIRONMENT

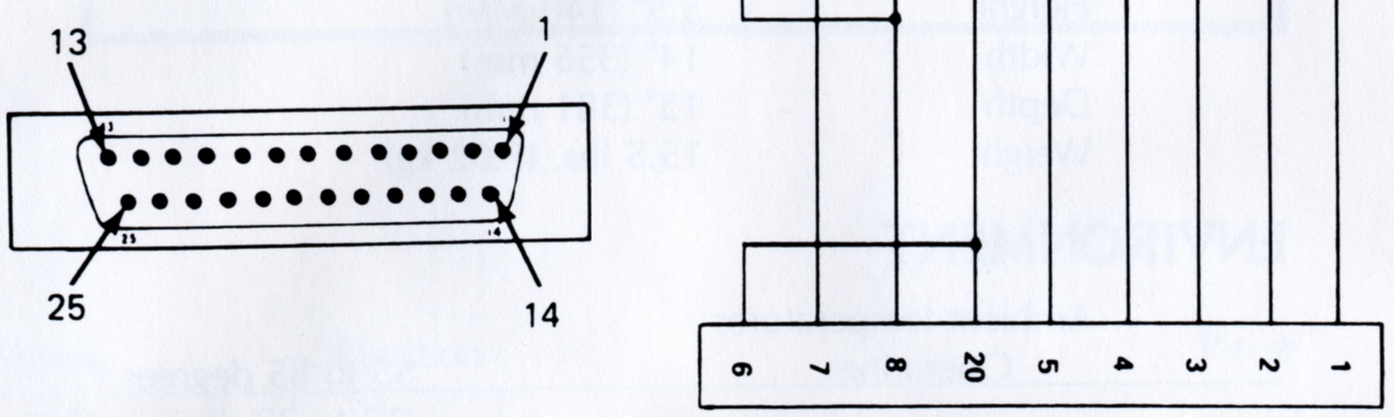
Ambient temperatures	
Operating	55 to 85 degrees F. (13 to 29 degrees C.)
Nonoperating	−40 to 140 degrees F. (−40 to 60 degrees C.)
Relative humidity	8% to 80%
Relative humidity gradient	
Operating	10% per hour
Nonoperating	Below that causing condensation
Maximum wet bulb Temp.	78.8 F. (26 C.) degrees non-condensing
Head dissipation	150 watts (511 BTU/hr) Max.
Altitude	Operating Density-Altitude 1500 to 9750 ft. (457 to 1982 m.) Storage 0 to 12000 ft. (0 to 3650 m.)

BUILT-IN 15-MEG HARD DISK DRIVE (TANDY 6000 HD)

Disk organization	
Cylinders per disk	306
Tracks per unit	1836
Tracks per platter	612
Sectors per track	34
Bytes per sector	256
Average latency	8.3 msec
Rotational speed	3600.0 rpm
Recording density	9625.0 bpi
Flux density	9625.0 fci
Track density	345.0 tpi
Storage capacity (hard disk)	
Unformatted per drive	19.0 Mbytes
Formatted per drive	15.5 Mbytes (primary) 15.9 Mbytes (secondary)

TANDY 6000 SYSTEM-TO-SYSTEM DIRECT COMMUNICATIONS

To directly connect 2 Tandy 6000s that have either built-in or external hard disk drives, use the wiring arrangement illustrated below.



Connection diagram, Tandy 6000 (Channel A or B) to Tandy 6000 (Channel A or B). Use stranded wire, 24-gauge, to connect 2 DB-25 connectors as illustrated. If the wire length exceeds 50 feet, twist lines 7 (GND), 2 (TD), and 3 (RD).

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the system administrator's guide to

XENIX™

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8/84

the system administrator's guide to XENIX™

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To the System Administrator:

As we prepared this guide, we tried to keep in mind your needs. We assume that you are relatively unfamiliar with XENIX, and perhaps have little computer experience, but are eager to establish an office system that uses XENIX as a base.

XENIX is a sophisticated, complex tool, but you don't have to know all about it or understand it completely to use it to great advantage. Therefore, in this guide we have frequently told you the hows and not the whys. We felt it was important to give you usable information quickly and simply.

When you feel comfortable using the procedures described here, you may want to learn more about XENIX. The following books are excellent sources and can be obtained at most bookstores with a computer science section:

> *Exploring the UNIX™ System*, by Stephen G. Kochan and Patrick H. Wood. Hasbrouck Heights, NJ: Hayden Book Company, 1984.
>
> *A User Guide to the UNIX™ System*, by Rebecca Thomas and Jean Yates. Berkeley, CA: Osborne/McGraw-Hill, 1982.

The Tandy XENIX system is in 2 parts — the Core System and the Development System. The Core System comes with your computer; if you want the Development System, you must purchase it separately. It contains programming tools and text-processing tools and is primarily for those who wish to use these advanced features.

We believe that as you increase your XENIX knowledge and skills, you will become intrigued with the possibilities for using it in your office. We welcome your comments and suggestions concerning XENIX and these guides. Please send them to:

> XENIX Editor
> Technical Publications
> 900 Two Tandy Center
> Fort Worth, TX 76102

Although we cannot acknowledge or respond to individual letters, we assure you that your communications will be taken into consideration as we prepare future versions of XENIX and later editions of these guides.

If you have specific questions or problems that require immediate attention, please contact our Computer Customer Service Department. The representatives in this department are specially trained to help you.

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introduction

This manual is for you, the System Administrator of a XENIX system. It contains the information you need to install, maintain, and run your XENIX system.

As System Administrator, you have important responsibilities. These include the following:

- Installing XENIX
- Installing applications programs
- Creating users
- Making backups
- Maintaining the file system
- Setting up terminals

XENIX provides you with powerful tools, and you can use them to create and maintain an extremely efficient data processing center for your business. This manual contains step-by-step instructions for completing all routine tasks. You can use it, *The User's Guide to XENIX*, and the *XENIX Quick Reference Guide to Commands* to establish and maintain a fully functioning multiuser, multitasking environment.

A glossary and an index are in the back of this manual. You can use these devices to locate specific information quickly.

XENIX and your computer keyboard

XENIX is a lowercase system. In general, it recognizes lowercase alphabetic characters. Be sure to type lowercase characters when entering commands. If you are typing text to be printed on the line printer, you can use uppercase, lowercase, or a combination.

Some of the keys on your keyboard have a special meaning to XENIX. You frequently use control key sequences in XENIX. When typing a control sequence, press CTRL, hold it down, and press the second key. Then, release both keys simultaneously.

The following are some useful keyboard patterns:

CTRL **d**	Logs you out of XENIX and ends input for some commands.
CTRL **q**	Starts scrolling (moves text up and off the screen) after you have stopped it.
CTRL **s**	Halts scrolling (stops text from moving up and off the screen).
CTRL **6**	Produces the tilde (~) on the screen.
CTRL **9**	Produces a backslash (\) on the screen.
CTRL **0**	Produces a vertical line, or pipe (|), on the screen.

Some important keys:

BREAK	Interrupts a command or program and returns you to your prompt.
ENTER	End every command in XENIX by pressing ENTER. If a screen message instructs you to type or press RETURN, press ENTER.

about your equipment

To run XENIX you must have:

- A Tandy computer with 512K memory
- A hard disk
- One floppy drive

You can use the following optional equipment:

- A Tandy line printer
- A maximum of 5 Tandy data terminals (more than 2 terminals requires the RS-232 card)
- Multiple floppy drives
- Multiple hard drives
- Modem
- Additional memory

1

installing XENIX on your hard disk

XENIX is supplied on 3 floppy diskettes — Boot Disk, Install 1, and Install 2: Before you can use XENIX, you must transfer the data on these diskettes to the hard disk.

Normally, you transfer XENIX to hard disk only once. After you have done so, however, keep the diskettes in a safe place in case you need to reinstall XENIX because of some problem with the hard disk. If you make a mistake during installation, press the reset switch and repeat the process from the beginning.

Before you begin, look at the Media Error Map that is attached to your hard disk. Copy the information from the TRACK and HEAD columns so that when asked to do so later you can enter it.

formatting your hard disk

1. Turn on the hard disk and then turn on your computer. Do not write-protect the hard disk.

   Note: Before formatting your hard disk, you should turn it on and let it warm up for 30 minutes.

2. Press [BREAK] and [REPEAT] simultaneously until the screen shows:

   ```
   INSERT DISKETTE
   ```

3. Place Boot Disk in floppy Drive 0. After the screen shows the copyright notice, the following prompt appears:

   ```
   Xenix Boot>
   ```

4. Type **diskutil** [ENTER], and the screen shows this message:

   ```
   Diskutil:  format or copy floppy diskettes, or format
   hard disks.

   At any time you may type <break> or press RESET to
   abort the procedure.  The backspace key may be used to
   correct single characters of your input. End each line
   you type by typing <enter>.

   Diskutil:  Hard or floppy disk (h or f)?
   ```

5. Type **h** [ENTER] and the screen shows:

   ```
   Hard disk unit number (0..3)?
   ```

Type **0** [ENTER] to indicate that you are formatting your primary, or first, hard disk. The screen now shows:

```
Destructive or Non-destructive format (d or n)?
```

Type **d** [ENTER].

6. The screen now shows:

```
Consult your computer manual, or the instruction sheet
that accompanies your hard disk, for the answers to
the following two questions:

How many cylinders (tracks)?
```

7. Answer this question and the one following with the numbers given in the manual. For example, if you have a 15-megabyte hard disk, there are 306 cylinders and 6 heads. After you answer both questions, the screen shows:

```
Desired interleave factor (<ENTER> for default)?
```

Press [ENTER].

8. Now the screen shows the following message:

```
Find the MEDIA ERROR MAP and type in the list of TRACK
and HEAD numbers as follows.  For instance, if the
list shows
     TRACK      HEAD      BYTE COUNT      LENGTH
      133        00          01333           02
      174        03          09826           05

you should type
     133,0 <enter>
     174,3 <enter>
     done <enter>
If the list is empty, just type "done".
At any time, you may type <break> to abort.

enter next pair or "done":
```

9. After you type **done** [ENTER], the following appears on your screen:

```
Full, partial, or no verify (f,p,n) ?
```

Type **f** [ENTER]. Always do a full verify when first formatting a hard disk.

Note: If you are reformatting to add an entry to the Media Error Map, be sure to enter all the bad tracks found by diskutil during previous formattings. You may use partial verify in this case to speed formatting, but we recommend that you use full verify. Partial verify takes about half the time of full verify.

10. When the verify is complete, your screen shows:

```
About to format hard disk drive 0.
This will take about xx minutes.
Type <enter> to proceed or <break> to abort:
```

On your screen, xx is the number of minutes. The time depends on the size of your hard disk.

11. Press [ENTER]. When the formatting is complete, the screen shows:

```
Hard disk successfully formatted.
Drive parameters and MEDIA ERROR MAP successfully
written.
```

```
Your hard disk is ready for the XENIX initialization.
Diskutil:  Hard or floppy disk (h or f)?
```

12. Press the reset switch and then press [BREAK] and [REPEAT] simultaneously until the following prompt appears on the screen:

```
Xenix Boot>
```

initializing your hard disk

Follow the steps below to initialize your hard disk.

1. At the prompt, press [ENTER] and the screen shows:

```
System loaded . . .
Change root disk if desired;
type <enter> to proceed or <break> to abort
```

2. Press [ENTER]. After a while, the following question appears on your screen:

```
Do you wish to initialize your hard disk?
```

Since you wish to do so, type **y** [ENTER]. Now the program asks:

```
Has your hard disk been formatted with diskutil?
```

3. Type **y** [ENTER]. The screen shows the following message:

```
Do you want the standard size swap area? [y or n]
```

Type **y** [ENTER].

Note: The swap area is the space XENIX uses to temporarily store information on running programs. The standard size is 2057 blocks. In most cases, you can use the standard size. If you want to change the size of this area, type **n** [ENTER] in response to the above question. XENIX then asks you a series of questions. Respond when you are prompted to do so.

4. Now, the screen shows that initialization is proceeding. This takes a few minutes. When initialization is complete, the screen shows:

```
Please reboot from the hard disk after the system
shuts itself down.

Halting system . . .
** Normal System Shutdown **

[Z80 Control System Halted]
```

5. Now, remove the Boot Disk from Drive 0.

Note: If, for some reason, you are reinstalling XENIX, the system may tell you that your hard disk contains data and ask whether you wish to "overwrite." Type **y** [ENTER] to finish initializing.

installing the XENIX core

Now you are ready to copy the contents of Install 1 and Install 2 onto your hard disk. In this phase you boot—startup—from your hard disk. To do so, press the reset switch, but do not press [BREAK]. The screen shows:

```
Xenix Boot>
```

Press [ENTER], and follow the steps outlined below to complete your installation of XENIX.

1. XENIX sometimes refers to a floppy diskette as a "volume." When it does so, simply follow the instructions as they pertain to the floppy diskette. When you press [ENTER] at the boot prompt above, the screen shows:

```
For each floppy in the distribution set, insert the
floppy into Drive 0 and press <Enter> or type y. Type
n after the last floppy is installed.

If you ever see the message "tar: please mount new
volume," insert the next floppy into Drive 0 and press
<ENTER>. Do not interrupt the installation of the
distribution at this point.

First Floppy? [y,n]
```

2. Insert Install 1 and type **y** [ENTER]. When the data is transferred to your hard disk, the screen shows:

```
Next Floppy? [y,n]
```

Remove Install 1 and insert Install 2. Type **y** [ENTER]. When the data on this diskette is transferred to your hard disk, the screen again shows:

```
Next Floppy? [y,n]
```

Remove Install 2 and type **n** [ENTER]. The screen shows:

```
Setting up directories and permissions.

Is this a Model II? [y or n]
```

3. Type **n** [ENTER], and the screen shows:

```
Setting floppy drives to faster seek speeds.

Installation complete.

Type CONTROL-d to proceed with normal startup, (or
give root password for system maintenance):
```

4. Type [CTRL] **d**. Your hard disk now contains the complete XENIX operating system. The last instruction above is the normal boot you see whenever you start the system. The next chapter explains how to log in and log out and how to shut down the system.

2

accessing XENIX

Now that you have installed XENIX on your hard disk, XENIX boots when you power up the hard disk and the computer. At this point in the installation, however, XENIX is booted, and you are ready to enter the date and time and log in. See the section at the end of this chapter for routine startup procedures when your system has been totally shut down.

XENIX asks you to enter the date and time in the following format:

```
yymmddhhmm
```

yy is the year; **mm** is the month; **dd** is the day; **hh** is the hour (in 24-hour units); and **mm** is the minutes. For example, to enter 2:Ø5 P.M., October 7, 1984, type:

8410071405 ENTER

You may press ENTER and not type the date and time at all. We strongly recommend, however, that you always type the full date and time. XENIX stores this information and lets you automatically access it in applications programs. The date is also important in determining when files were created or changed. If you press ENTER and do not type a date, XENIX uses the date it displayed as the current date.

Now type the current date and time and you are ready to log in.

logging in

Logging in is simply identifying yourself to XENIX. As the System Administrator, you may log in as "root" and as "user." And, as the System Administrator of a multiuser system, you are the only person who can log in as root. For now, we will show you how to log in as root, how to assign yourself a root password, how to log out, and how to shut down the system. In the next chapter, we will show you how to log in as user and how to create other users.

You must log in as root to perform the following operations: install applications programs, make periodic and daily backups of the system, restore a hard disk, check the files.

1. After you enter the date and time, the screen shows:

   ```
   login:
   ```

   Type **root** ENTER.

2. The root prompt **(#)** now appears on your screen. Type:

   passwd ENTER

The screen shows:

```
Changing password for root
Enter new password (minimum of 5 characters)
Please use a combination of upper and lowercase
     letters and numbers.
New password:
```

Choose your password carefully. It can contain a minimum of 5 characters and can consist of any characters on the keyboard except [BACKSPACE], [BREAK], and [ENTER]. Mix upper- and lowercase characters and numbers. Be sure that it is not something easily guessed or something that you might not remember.

Warning: Do not forget your root password. If you do forget, you must reinstall the XENIX system from the distribution floppy diskettes.

3. Type your password and then press [ENTER]. Notice that the screen does not display the password.

4. Now the screen shows:

```
Re-enter new password:
```

5. Type your password again and press [ENTER]. XENIX records your password in a file called /etc/passwd. The screen shows the root prompt.

logging out

To log out, or sign off, at the root prompt type:

[CTRL] **d**

XENIX returns to the login: prompt. In a multiuser environment, the system is now ready for a new user to log in.

At this point, you can shut down the system and turn off your computer, hard disk, and peripherals. We recommend, however, that you leave your system up and running 24 hours a day. Password protection makes your files secure, and the continuing successful operation of your hardware is more assured if the system is not turned on and off with any frequency. The cost of power to keep it running is offset by fewer hardware repair bills and less down time.

shutting down the system

Although we recommend that you not shut down the system on a regular basis, the routine for shutting down is given below.

Caution: If you are in a multiuser environment, that is, if other users are logged in on terminals, you should warn users before shutting down the system. To do so, at the root prompt type **shutdown** [ENTER]. XENIX asks you how many minutes until shutdown and then sends a message to that effect to all users. XENIX then shuts down at the specified time.

If the system is not shut down properly, the next time you boot XENIX you may see a message that the system was not shut down properly and needs cleaning. XENIX will ask if you wish to proceed with cleaning. Always respond "yes" to this question.

1. The screen now shows the login: prompt. Type **root** [ENTER] and then type your password.

2. When the root prompt appears, type:

   sync; /etc/haltsys [ENTER]

   Note: If you want extra protection for your hard disk, before typing the above command type **/etc/park –on** [ENTER]. The read/write head of the hard drive moves to the last cylinder of the hard disk. Using **park** protects your hard disk from accidentally being damaged by a hard knock or a power surge. When you start up XENIX for the first time, park is off. This means that the read/write head is not moved before shutdown. If park is on, you may need to press the reset switch twice to reboot XENIX.

3. The following appears on your screen:

   ```
   ** Normal System Shutdown **
   [Z80 Control System Halted]
   ```

4. Now turn off your computer and then turn off your hard disk.

starting up after shutdown

Your entire system is now turned off. Turn on the computer and then turn on the hard disk.

1. The following appears on your screen:

   ```
   Xenix Boot>
   ```

2. Press [ENTER]. After XENIX boots, the screen displays information about availability of system space. Then the following instructions appear:

   ```
   Type CONTROL-d to proceed with normal startup, (or
   give root password for system maintenance):
   ```

3. Type [CTRL] **d**. Enter the date and time, and then log in as root and enter your password. The root prompt appears on your screen.

   Note: Be sure to wait until the password prompt appears to type your password. If you type it ahead of the prompt, the screen shows your password.

   You are now ready to create users.

3

adding users

As the System Administrator you are now able to log in as root, but you also need to be able to log in as a user. You should log in as root only when you need to perform tasks that only root has the power to do; otherwise, log in as a user.

In some situations, you may need to let someone besides yourself have access to your root password. Anyone who knows this password can also log in as root and use root's full powers. Everyone with access to the root password needs to be aware that making even a minor mistake in the root mode can cause major problems with the system. Therefore, log in as root only when it is absolutely necessary.

One of the special powers available only to root is that of creating users. You do this with a program called **mkuser**. In a multiuser environment you will need to create several users. You add users to the system one at a time. First, however, create a user directory for yourself.

creating a user

1. At the root prompt, type:

   mkuser ENTER

   The screen shows:

```
Newuser

Add a user to the system

Do you require detailed instructions? (y/n):
```

2. Because this is your first time to set up a user, type **y** ENTER, and XENIX takes you through the mkuser program step by step. The screen now shows:

```
-----Add a new user to this system-----

This program will guide you through the steps required
to add a new XENIX user to the system. It will ask for
the following information. If you don't know any of
these items, press BREAK and come back later.

     login name,   comment,  group, shell, password

Generally the program will tell you what it wants
(such as the login name), describe the acceptable
responses, and prompt you for an answer.

Nothing is updated on the system until you confirm
everything is correct. The program will ask you this
after you have entered all the information. At any
time until then you can press BREAK to exit without
adding the user. You can also answer 'q' or 'quit' to
any question to achieve the same effect.

Press RETURN to start:
```

3. Press [ENTER].

   Note: Whenever XENIX refers to [RETURN] or asks you to press [RETURN], always substitute [ENTER].

4. Now the screen shows:

```
Please give the new user's login name.  This must be
at least 3 characters long, begin with a lower case
letter, and contain only lower case letters and
digits.  It must also not already exist in this system

Enter new user's login name:
```

   Because you are setting up the first user on your system, the login name can be anything you choose. It is usually convenient to use a form of the user's real name. For example, if the user's name is Ross Pratt, the login name can be ross, rossp, rpratt, and so on.

5. Type ***name*** [ENTER]. The screen shows:

```
Users are usually assigned to the default user group.
This is the group name "group", number 50.  If you
want to assign the new user to some other group, you
can either specify an existing group, or a new group
to be created.

Do you want to use the default group? (y/n):
```

6. Type **y** [ENTER]. The screen shows:

```
Please give the initial password for this user.

For maximum security a minimum number of characters is
required. Up to eight characters are significant. You
may use any characters except RETURN and LINE FEED.

Note that the password entry will NOT echo on the
screen. This is just to provide an extra degree of
security.

If you don't want a password for this user, just type
RETURN.

Please enter at least 5 characters for the password.
Enter password:
```

7. Type the password you have chosen and press [ENTER].

   Note: As you did when you selected your root password, choose a password that is not easily guessed and that you can easily remember. Forgetting a user password is not critical, however. If this occurs, you or any other user can simply select a new one. You, the System Administrator, must install a new password for any user who forgets his or her password. Instructions for doing so are below.

8. The screen now shows:

```
Re-enter for check:
```

   Type your password again and press [ENTER].

9. The screen shows:

```
Please specify the type of shell (command interpreter)
this user requires.  You can type 1, 2, or 3 as
follows:

      1    Standard (Bourne) Shell.
      2    Visual Shell.
      3    C Shell.

ENTER Shell type (1,2 or 3) and press ENTER:
```

Type **1** [ENTER].

Note: You must specify Option 1. If you specify Option 2 or 3, XENIX nevertheless places you in the Standard Shell.

10. The screen now shows:

```
There is an optional field in the password file where
you can put a comment, such as the user's fullname,
phone #, room #, etc.  If you wish to leave this
blank, just type RETURN.  The comment should be short
(up to 20 characters).

Please Enter Comment: >____________________
>
```

11. Press [ENTER] and the screen shows:

```
These are the details you have entered for the new
user.  Please check they are correct.

User name is: name, user id is xxx.
Group name is "group", group number is 50.
Comment Field is:
Shell is "/bin/sh"

Do you want to change anything? (y/n):
```

Type **n** [ENTER].

12. The screen shows:

```
Password file updated
Group file updated
Home directory /usr/name created
/usr/name/.profile created
User name added to this system

Do you want to add another user? (y/n):
```

13. Type **n** [ENTER], and the screen shows the root prompt.

Now that you have worked through the mkuser program following the detailed instructions, you can shorten the procedure by simply responding to a series of prompts that appear on your screen.

1. At the root prompt, type:

   mkuser [ENTER]

2. The screen shows:

```
                    Newuser

              Add a user to the system

       Do you require detailed instructions? (y/n):
```

3. Type **n** [ENTER] and XENIX asks for the login name. Type ***name*** [ENTER]. The screen shows:

```
Do you want to use the default group?(y/n):
```

4. Type **y** [ENTER]. The screen shows:

```
Please enter at least 5 characters for the
password
Enter password
```

5. Type your password and press [ENTER]. The screen shows:

```
Re-enter for check:
```

6. Type your password again and press ENTER. The screen shows:

```
ENTER Shell type (1,2 or 3) and press ENTER:
```

7. Type **1** ENTER, and the screen shows:

```
Please Enter Comment: >____________________
                      >
```

8. Press ENTER. The screen shows:

```
User name is "name", user id is xxx.
Group name is "group", group number is 50.
Comment Field is:
Shell is "/bin/sh"

Do you want to change anything? (y/n):
```

9. Type **n** ENTER. The screen shows:

```
Password file updated
Group file updated
Home directory /user/name created
/usr/name/.profile created
User name added to this system

Do you want to add another user? (y/n):
```

10. Type **n** ENTER, and the root prompt appears.

changing a user password

A user who wishes to do so may change his or her password when logged in. However, only you, as System Administrator, may create a new password if a user forgets his or her password.

creating a new user password

1. At the root prompt, type:

   passwd *login name* ENTER

2. The screen shows:

```
Enter new password (minimum of 5 characters)
Please use a combination of upper and lowercase
letters and numbers.
New password:
```

3. Type the new password and press ENTER. The screen shows:

```
Re-enter new password:
```

   Type the new password again and press ENTER.

   The screen shows the root prompt. Now the new password is substituted for the old, forgotten one.

changing a user password

1. At the user prompt ($), type:

   passwd ENTER

2. The screen shows:

```
Changing password for user
Old password:
```

Type your password and press ENTER. The screen shows:

```
Enter new password (minimum of 5 characters)
Please use a combination of upper and lowercase
letters and numbers
New password:
```

3. Type your new password and press ENTER. The screen shows:

```
Re-enter new password:
```

Type your password again and press ENTER. The screen shows your user prompt. The new password is substituted for the old one.

4

installing and using applications programs

As the System Administrator, you are responsible for installing applications programs and for instructing users in how to access them, use them, and back up the data they enter. To install an applications program, you must be logged in as root.

installing an applications program

1. At the root prompt, type:

   install [ENTER]

2. The screen shows the following Installation Menu:

```
Installation Menu

        1. to install
        q. to quit

Please select :
```

3. Type **1** [ENTER] to select the Install option. The screen shows:

```
Insert diskette in Drive 0 and press <ENTER>
```

4. Insert the first installation diskette in Drive 0, close the drive door, and press [ENTER]. If the application is complete on 1 diskette, the screen shows:

```
Installation complete--Remove the diskette, then
press <ENTER>.
```

   If the application is contained on more than 1 diskette, XENIX tells you when to insert the remaining diskettes and then displays the above message when the installation is complete.

5. After you press [ENTER], your screen shows the Installation Menu again. If you wish to install another application, type **1** [ENTER] and follow the above instructions. Otherwise, type **q** [ENTER] and you return to the root prompt.

accessing applications programs

Both the System Administrator, logged in as root, and the user can access applications programs. You, as System Administrator, can, however, restrict a user's access. Instructions for how to do this are in Chapter 6.

To access an applications program for which you have permission as a user, at the user prompt type:

program name ENTER

Although the System Administrator, logged in as root, can access all applications programs on the system, we recommend that you do so as a user.

backing up applications files

Backing up is a very important procedure in all data processing environments. It is analogous to making a carbon copy or a photocopy of a document you typed on a typewriter.

Backing up in a computerized system, however, is even more important. You need not only to make a copy of your documents but also to make a copy of the system on which you created the documents. This is your responsibility as System Administrator, and the next chapter tells you how.

The manual that comes with an applications program may contain instructions for making a copy on floppy diskette of the data you created on your hard disk. If so, follow those instructions exactly to back up your applications files. If the manual does not contain backup instructions, you can use the procedure that follows.

Before you can make backups, however, you must format the diskettes onto which you will copy data. Both the System Administrator and the User can format diskettes using the **diskutil** program, which you access from the XENIX Boot prompt.

You can format as many diskettes as you wish at any one sitting. We recommend that you keep an ample supply of formatted diskettes on hand. This can save time when you wish to back up files at the end of a working period.

formatting diskettes

1. Because you are currently logged in to the system, shut down the system and then press the reset switch. The following boot prompt appears on your screen:

   ```
   Xenix Boot>
   ```

2. Beside the prompt, type:

   diskutil ENTER

3. Your screen displays the following message:

   ```
   Diskutil: format or copy floppy diskettes, or
   format hard disks.

   At any time you may type <break> or press RESET
   to abort the procedure.  The backspace key may be
   used to correct single characters of your input.
   End each line you type by typing <enter>.

   Diskutil:  Hard or floppy disk (h or f)?
   ```

4. Type **f** ENTER. The screen shows:

   ```
   Copy or format (c or f)?
   ```

5. Type **f** ENTER. The screen shows:

   ```
   Format floppy disk in drive number (0..3)?
   ```

Respond by typing the number of the floppy drive into which you plan to place the floppy diskette to be formatted. Then press ENTER.

6. Now the screen shows:

```
About to format floppy disk in drive 0.

Type <enter> to proceed or <break> to abort:
```

7. Insert the diskette and press ENTER. Be sure the diskette has a write-enable tab. When the diskette is formatted, the screen shows:

```
Disk format and verification complete.
About to format floppy disk in drive 0.
Type <enter> to proceed or <break> to abort:
```

8. If you will need more than 1 diskette to back up your files, remove the formatted diskette, insert a new diskette, and press ENTER. When you have formatted all the diskettes you will need, press the reset switch, and the XENIX boot prompt reappears on your screen.

backing up your files

You are now ready to back up your applications files.

1. Place your formatted diskettes within easy reach and log in to XENIX as a user. Now type:

   tsh ENTER

2. Insert a formatted diskette in floppy Drive 0, and at the tsh prompt (tsh>), type:

   save 0 -ss /usr/*name*/'*filename*' ENTER

   save is the command that tells XENIX to copy information from the hard disk. **0** indicates that the information is to be copied onto the diskette in floppy Drive 0. **-ss** indicates that the diskette is single-sided. If you are using double-sided diskettes, you type **-ds**. ***name*** is your login name, and ***filename*** is the name you gave the file when you created it.

   You can back up more than 1 file on a disk. To do so, simply specify each filename on the command line; separate filenames with spaces.

   Be sure to type the command exactly as shown, including the spaces and slashes. Substitute your name and the filename appropriately for the words in italics.

3. When the screen indicates that the file or files have been found, your backup is complete. To leave tsh, type:

   exit ENTER

   Your user prompt now appears on the screen.

restoring applications files to your hard disk

If you wish, you can later restore to your hard disk the information you copied to floppy diskette.

1. Log in to XENIX as a user. Place the diskette you wish to restore in floppy Drive 0. At your prompt, type:

   tsh ENTER

2. At the tsh prompt, type:

   restore 0 ENTER

3. When the screen indicates that the file or files have been restored, you can then restore more files or exit tsh.

   You can also use **tar** to back up and restore. For instructions, see Chapter 9.

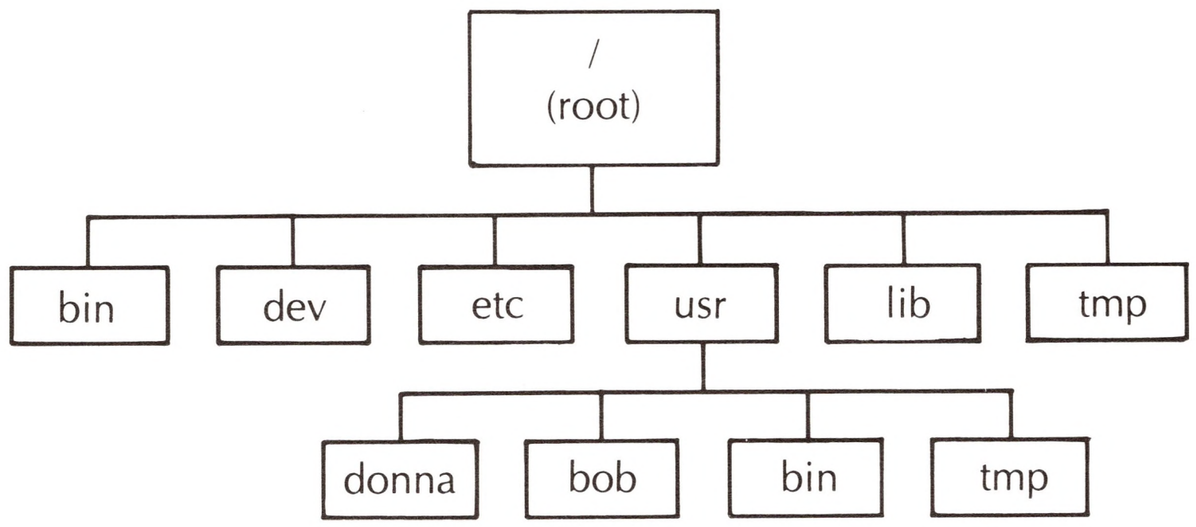
5

directories and files

XENIX is organized in a system of directories and files. Directories can themselves contain other directories, or subdirectories, which in turn contain files. XENIX stores information in directories and files in much the same way that a filing cabinet does. A directory is similar to the file cabinet itself, and a subdirectory is like a drawer in a file cabinet. Within the drawer are folders, some of which contain other folders that contain memos, letters, reports, charts—all kinds of information.

XENIX directories and files are organized "hierarchically"; that is, all directories and files branch from a single root. A chart of these directories and files looks like an inverted tree. The trunk is at the top, representing the "root" directory, and the main branches, smaller branches, and twigs are other directories and subdirectories. The leaves are the files.

Below is an example of a typical XENIX organizational structure.



When you log in to XENIX as root, you are in the root directory. XENIX uses the slash (/) to symbolize the root directory. When you create a user, XENIX automatically assigns that user a workspace called /usr/*name*. **/usr** is a major XENIX directory that contains the workspaces of all users on the system. The user's login name is a subdirectory of /usr; it is also called the user's "home directory."

The user may create further subdirectories in his or her home directory and may create files within those subdirectories. To access a file you have already created, you need to know its "pathname." A pathname is exactly what the word implies—the path XENIX takes to find the file. It consists of the directories and subdirectories within which the file exists and the name of the file.

For purposes of the examples that follow, now log in as user. You are automatically in your home directory.

creating directories and files

Although you can use XENIX to perform many complicated tasks, you can also use it to perform some simple tasks that will streamline your office routine. These examples show you how.

1. To use XENIX as a reminder service, first create a subdirectory within which you can create a "To Do" file. At the prompt, type:

   mkdir schedule ENTER

2. Now your home directory contains a subdirectory called "schedule." You are still in your home directory, however. To create a file in the schedule directory, you must be **in** that directory. To get to the schedule directory, you must change directories. Type:

   cd schedule ENTER

3. Within the schedule directory, you can now create a "To Do" file. At the prompt, type:

   cat >todo ENTER

   The file is created, and you can now place information in it. Notice that we typed the filename in all lowercase letters and omitted the space between the 2 words. You can use any characters in a filename except the slash. You can also use spaces. If you do, however, when you access the file, you must enclose it in single quotes.

   Note: You can use the same filename for different files, but the files must be in different directories. The same file can exist several times in the same directory, but each time it must have a different name.

4. You are now ready to make notes in your todo file. Type whatever you wish. To end a line, press ENTER. When you finish, type CTRL **d**, and the system prompt appears on your screen.

5. Now create another directory and another file. This time create a file of frequently used names, addresses, and phone numbers. First, determine your current directory, that is, the directory you are in at present. To do so, type:

   pwd ENTER

   The screen shows:

   /usr/*name*/schedule

6. To create another directory in your home directory, you must again change directories; that is, you must leave the schedule directory and go to the /usr/*name* directory. To do so, type:

   cd /usr/*name* ENTER

7. Now you are ready to create another directory called phonebook. To do so, type:

   mkdir phonebook ENTER

8. To move to the phonebook directory, type:

   cd phonebook ENTER

   Verify that you are now in the phonebook directory by typing:

   pwd ENTER

9. To create a file, type:

   cat >namelist ENTER

   As in Step 4, make entries in your file and then type CTRL **d**. The user prompt appears on your screen. To return to your home directory, type:

   cd /usr/*name* ENTER

   You can also type **cd** ENTER (without the filename) to get to your home directory.

displaying the contents of directories and files

1. You can verify that the directory and files you created now exist. To list (or display) on the screen the contents of your home directory, type:

   lc ENTER

   The screen shows:

   ```
   phonebook    schedule
   ```

   Note: The list is in alphabetic order.

2. To display the contents of the todo file on the screen, first move to the schedule directory. Type:

   cd schedule ENTER

3. Now type:

   cat todo ENTER

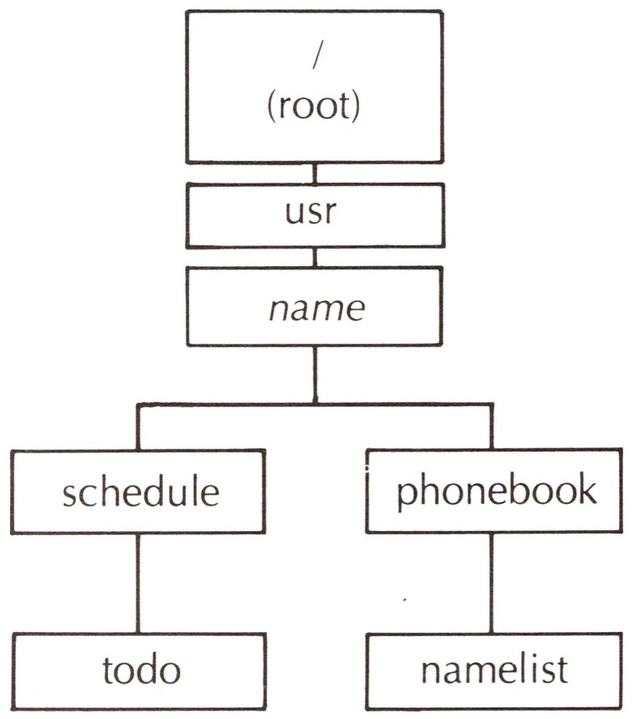
   Your screen shows the list of things you have to do that you entered earlier. Now display the contents of namelist. First, move to the phonebook directory. To do so, type **cd /usr/*name*/phonebook** ENTER. Now type:

   cat namelist ENTER

   Note: For an explanation of some new words you've been using in these examples (cat, cd, lc, mkdir), see the "Quick Reference Guide to Commands" section in this manual.

moving files

You now have 2 directories in your home directory, and you have a file in each of these directories. In the XENIX hierarchical system, a diagram that shows these files and directories looks like this:



You may occasionally want to move a file from one directory to another. For purposes of example, let's move the todo file out of the schedule directory and into the phonebook directory.

1. After you displayed the namelist file above, you were in the phonebook directory. To move the file, first position yourself in the directory in which that file exists. To do so, type:

   cd /usr/*name*/schedule ENTER

2. Verify that you are in the schedule directory by typing **pwd** ENTER. Now, at the prompt type:

   mv todo /usr/*name*/phonebook ENTER

3. Now move to the phonebook directory. Type:

   cd /usr/*name*/phonebook ENTER

4. List the contents of the phonebook directory. Type:

   lc ENTER

   Your screen shows that the phonebook directory now contains 2 files—namelist and todo.

   Note: To keep the todo file in the schedule directory and also place a copy of it in the phonebook directory, follow Steps 1-4 above and change Step 2 slightly. Instead of typing **mv** (move), type **cp** (copy).

removing a file

To remove, or delete, a file you must position yourself in the directory that contains the file. For purposes of this example, delete the todo file from the phonebook directory, where you last placed it.

1. First, verify that you are in the phonebook directory by typing **pwd** ENTER. Now, type:

   rm todo ENTER

2. Now list the directory contents to verify that todo has indeed been removed. Type:

   lc ENTER

   Your screen shows that the directory now contains only 1 file—namelist.

   Note: If you want to remove all the files in a directory, you can do so by typing **rm *** ENTER. The asterisk (*) is the wild card character and in this case tells XENIX to remove all files. **Use rm* with extreme caution. You can inadvertently lose all your files.**

removing a directory

Before you can remove a directory, you must first remove all the files in that directory. Since you have already removed the file from the schedule directory, it is empty and you can delete it.

1. You cannot be positioned in a directory you are removing. You were in the phonebook directory when you deleted the todo file. Type **pwd** ENTER to verify that you are still there.

2. To return to your home directory, type:

   cd /usr/*name* ENTER

3. Now to remove the schedule directory, type:

   rmdir schedule ENTER

4. To verify that the schedule directory no longer exists, list the contents of your home directory. Type:

   lc /usr/*name* ENTER

   Your screen shows that your home directory contains the phonebook directory but not the schedule directory.

6

permissions

As System Administrator logged in as root, you have access to every directory, file, and program in your XENIX system. This means that you have total read, write, and execute permission. In other words, you can ask XENIX to display any file on the screen and you can read its contents. You can also use **ed** to change its contents (write to the file). In addition, you can execute, or run, any program in the system.

These 3 kinds of permissions—read, write, annd execute—can be given or denied to anyone logged in to the system. One of your responsibilities as System Administrator is to set permissions. Before doing so, however, you need to know how permissions affect a user's ability to access the system.

If you have **read** permission for a file, you can display it on the screen and read the information in it. If you have read permission for a directory, you can display its "table of contents" on the screen. That is, you can see a list of all the subdirectories and files in that directory.

If you have **write** permission for a file or a directory, you can move it, add to it, delete information from it, remove it, rename it, or change it in any way. If you have write permission for a directory, you can create subdirectories and files within it.

If you have **execute** permission for a program, you can run it. If you have execute permission for a directory, you can move into it and search it for files, such as programs to run.

The 3 kinds of permission are available to 3 categories of users: individual users (u), groups (g), and others (o). An individual user is the owner of a particular file or directory. He or she usually has read, write, and execute permission for all files and directories in his or her home directory.

A group of users may have collective permissions for a particular file or directory. For example, if several users are working on a single project, you, as System Administrator, can give them group permissions rather than individual user permissions.

Others are anybody and everybody who neither own a file or directory nor are members of an owner's group.

reading permission settings

Whenever a user creates a file or directory, XENIX automatically assigns these permissions: read and write for the user, read for the user's group, and read for others on the system.

You can look at the permission settings on a particular file or directory. For purposes of example, let's look at the phonebook directory you created earlier. To do so, log in as root, and at the root prompt, type:

lc -l /usr/*name* ENTER

Of course, use the user name under which you created the directory. Your screen shows:

```
total x
-rw-r-----  1 name  group 344 Aug 16 15:00 .profile
drwxr-xr-x  2 name  group  32 Aug 16 17:15 phonebook
```

Note: Your screen shows 2 entries in this directory—.profile and phonebook. The date for .profile is the date you created this user. The date for phonebook is the date you created your phonebook directory.

For purposes of example, let's look in detail at the entry for your phonebook directory. The 10-character letter-and-dash grouping that begins with d describes the permissions.

d Indicates that this is a directory, not a file. A file is indicated by a dash (-) in this place.

rwx The characters in these next 3 positions indicate the individual user's permissions. In this case, they are read, write, and execute.

r-x These 3 characters indicate the permissions of the members of the individual user's group. In this case, they are read and execute, not write, since a dash is in the write position.

r-x These 3 characters indicate the permissions of others. In this case, they are read and execute.

The number 2 following the permission settings is the number of links for this directory. (A link is a connection between blocks.) XENIX uses this information internally.

The next numbers show the size of the directory in bytes.

The date and time indicate when the directory was created or last changed. The last item on the line is the name of the directory.

setting and changing permissions

To set or change permissions, you must be in the directory in which you want to make changes. You use the following characters when changing permissions:

u	user	+	add
g	group	-	remove
o	other	=	set
a	all		

You also use r, w, and x to indicate read, write, or execute permission.

For purposes of example, let's change the permissions for the phonebook directory.

1. Position yourself in the /usr/*name*/phonebook directory.

2. To give the individual user, the group, and others read, write, and execute permission, type:

   chmod a=rwx /usr/*name*/phonebook ENTER

   chmod tells XENIX to change mode.

3. To verify that the settings have been changed, type:

   lc -l /usr/*name* ENTER

4. Your screen shows that everyone now has read, write, and execute permission. The settings are:

   ```
   drwxrwxrwx
   ```

5. To remove permissions, you use the minus sign. Let's remove write permission for others. At the prompt, type:

   chmod o-w /usr/*name*/phonebook ENTER

6. You can verify that the changes were made. To add permission, you use the same format, or syntax as above, substituting the appropriate user character and the plus sign.

7

backing up

Backing up is a standard operating procedure that ensures the safekeeping of the information you store on your hard disk and on floppy diskettes. Data can be lost under various circumstances—a power failure, inadvertent removal of files, a hardware malfunction, and so on.

As the System Administrator, one of your primary responsibilities is making system backups. Only you, logged in as root, may do this.

We recommend that you schedule regular backups; daily is probably best. Label your floppy diskettes so that you can easily retrieve the appropriate ones when necessary, and keep them in a place where they cannot be damaged by excessive heat or dust or by a magnetic field.

With XENIX you can back up your hard disk to floppy diskette, and you can back up one floppy diskette to another. Since your XENIX is new and this is the first time you have backed it up, XENIX requires that you do a full system backup. After this, you can do a periodic backup, or a backup that copies only those files you created since the last full system backup.

backing up your hard disk

First, using diskutil, format all the floppy diskettes you will need. If you are ever unsure about the number, format more diskettes rather than fewer. For this example, format 5 diskettes. (See Chapter 4 for instructions.) After doing so, press the reset switch and reboot XENIX.

1. Log in as root.
2. Now to begin backing up your hard disk, at the root prompt type:

   sysadmin ENTER

3. The following menu appears on your screen:

```
                File System Maintenance

Type      1 to do daily backup,
          2 to backup all files,
          3 to get a backup listing,
          4 to restore a file,
          5 to restore a hard disk,
          6 to check a file system,
          q to quit

     > Enter Number:
```

4. Type **2** [ENTER] to back up all files. The screen shows:

```
FULL SYSTEM DUMP
Backup which hard drive (0-3)?
```

5. Type the number of the hard drive you want to back up (in this case Drive 0, or the primary hard disk) and [ENTER]. The screen shows:

```
Backup to which floppy drive (0-3)?
```

6. Type **0** [ENTER]. Now the screen shows:

```
Type 1 for single sided, 2 for double sided:
```

7. If you are using single-sided floppy diskettes, type **1** [ENTER]. If you are using double-sided diskettes, type **2** [ENTER]. After you enter either 1 or 2, the screen shows:

```
Insert disk in drive 0, then press ENTER
```

8. When the diskette is full, the screen shows:

```
Change volumes and press <ENTER> to continue.
```

9. Insert a new formatted diskette. The cursor stays at the end of the prompt until you press [ENTER].

   Note: Be sure to label each diskette with the date, and number the diskettes in the order in which the backup was done.

   When the entire file system is backed up, the screen shows:

```
DONE
```

10. XENIX returns to the File System Maintenance menu. Type **q** [ENTER] to quit, and the root prompt appears on your screen.

    Note: To do a daily backup, or a backup of all files since the previous backup, select 1 at the File System Maintenance menu and respond to the prompts in a manner similar to the above instructions.

backing up floppy diskettes

In a multiuser environment, you may on occasion need duplicates of files that have been backed up on floppy diskette. You back up floppy diskettes with diskutil.

1. If you are at the root prompt, shut down the system and press the reset switch. At the XENIX Boot prompt, type:

   diskutil [ENTER]

2. The screen displays the following message:

```
Diskutil: format or copy floppy diskettes, or format
hard disks.

At any time you may type <break> or press RESET to
abort the procedure. The backspace key may be used to
correct single characters of your input. End each line
you type by typing <enter>.

Diskutil:  Hard or floppy disk (h or f)?
```

3. Type **f** [ENTER], and the screen shows:

```
Copy or format (c or f)?
```

4. Type **c** [ENTER], and the screen shows:

```
Source drive number (0..3)?
```

5. For purposes of this example, we assume you have at least 2 floppy drives. You will place your source diskette in Drive 0 and your destination diskette in Drive 1. To answer the prompt in Step 4, type **0** [ENTER]. The screen shows:

```
Destination drive number (0..3)?
```

6. Type **1** [ENTER] and the screen displays the following instructions:

```
Insert source disk in drive 0
Insert destination disk in drive 1

Type <enter> to proceed or <break> to abort:
```

7. Place the diskettes in the appropriate drives and press [ENTER]. The screen shows the following message while the backup is in progress.

```
This will take about 77 seconds.
     Copying cylinder __, side __
```

As diskutil copies each cylinder, the number of that cylinder scrolls past. If you are using single-sided diskettes, the side number remains 0. If you are using double-sided diskettes, the side number changes from 0 to 1 after Side 1 is copied. When the copy is complete, the screen shows:

```
Disk copy and verify complete.

Insert source disk in drive 0
Insert destination disk in drive 1

Type <enter> to proceed or <break> to abort:
```

8. If you wish to copy more diskettes, remove the diskettes just copied, insert others, and follow the instructions above.

9. If you do not wish to copy more diskettes, press the reset switch, reboot XENIX, and log in as root.

8

restoring information to your hard disk

Maintaining an up-to-date library of backup diskettes lets you easily and accurately restore the information to your hard disk if for any reason it ceases to function properly and your data is destroyed. You can also use your backup diskettes to transfer the information on one hard disk to another hard disk.

As System Administrator, you are responsible for maintaining a complete and accurate backup library and for restoring information to hard disk when necessary. To do so, you must be logged in as root.

If you have been working through this manual in a tutorial fashion, and we assume that you have, the following instructions are for information only. **Do not use them now.** Use them only when your hard disk fails and you need to restore data. At present, your hard disk is up and running, and the information on it is intact. If you attempt to restore over a properly functioning hard disk, you can damage your files.

These instructions for restoring information to hard disk are organized according to system design—Restoring a Primary Hard Disk with 2 or More Floppy Drives, Restoring a Secondary Hard Disk with 1 or 2 Floppy Drives, and Restoring a Primary Hard Disk with 1 Floppy Drive. When you need to restore a hard disk, follow the instructions that correspond with the design of your system.

restoring a primary hard disk with 2 or more floppy drives

Warning: Use these procedures only when you encounter serious difficulties with your hard disk that can be remedied in no other way.

Your XENIX package contains a diskette labeled File Maintenance Diskette. You use it to quickly and efficiently restore files or an entire system to your primary hard disk. Before you begin, be sure that all your backup diskettes are at hand. Turn on your hard disk, turn on your computer, and format your hard disk if necessary. (See Chapter 1 if you need format instructions.)

1. Insert the File Maintenance Diskette in Drive 0. Press the reset switch, and then press [BREAK] and [REPEAT] simultaneously until the following appears on your screen:

```
Xenix Boot>
```

2. Press [ENTER] and your screen shows:

```
System loaded
Change root if desired
type <enter> to proceed or <break> to abort
```

3. Press [ENTER] and the following menu appears:

```
                File System Maintenance

Type        1 to get a backup listing,
            2 to restore an entire dump,
            3 to restore a daily dump,
            4 to check a file system,
            q to quit
```

Note: "Dump" refers to your backup diskettes. Restoring an entire dump is restoring everything that was backed up from your hard disk to floppy diskette, including your XENIX system. Restoring a daily dump is restoring the information on diskettes that was obtained during a periodic backup.

4. Type **1** [ENTER] to verify that you are restoring the latest backup. Answer the prompts, and insert your first backup diskette in Drive 1 when asked to do so.

5. When the backup listing is complete, press [ENTER] to return to the File System Maintenance menu. Now type **2** [ENTER], and the screen shows:

```
RESTORE AN ENTIRE DUMP SET TO A HARD DISK

Restore to which hard drive (0-3)?
```

Note: Although XENIX gives you the option of entering the number of a secondary hard drive, enter only **0** in response to this prompt.

6. Type **0** [ENTER], and XENIX asks for information about your hard disk. Be sure to respond with the same data you entered when you formatted the hard disk. After you enter the information, your screen shows:

```
About to erase any data on drive 0
Press ENTER to continue:
```

Note: Any existing information on your hard disk will be overwritten when the full system dump is restored. Your backup diskettes contain everything that was on the hard disk; so you need not be concerned about this warning. It is simply a reminder.

7. Press [ENTER], and then answer the prompts as they appear on the screen. During the process of restoring, you may see the following message on your screen:

```
"/dev/rhd0" contains data; press <ENTER> to continue
or <BREAK> to abort:
```

8. Press [ENTER] and continue restoring. When all the information on your backup diskettes has been restored to your hard disk, your screen shows:

```
End of Dump
```

9. The File System Maintenance menu reappears on your screen. Type **4** [ENTER] to select check a file system. Answer the prompts as they appear.

Warning: Before selecting File System Check, be sure the file system is not mounted on a secondary hard disk. If it is mounted, files may be lost.

10. When the verification of the file system on your hard disk is complete, the File System Maintenance menu appears on your screen. Press [ENTER] to quit,

and wait until your screen shows:

```
[Z80 Control System Halted]
```

11. You can now press the reset switch and boot XENIX.

restoring a secondary drive with 1 or 2 floppy drives

Your XENIX Core contains a special program called **/etc/sysadmin**. You can use it to restore files or an entire system to a secondary hard disk.

restoring files

1. Log in to XENIX as root, and at the root prompt type **/etc/sysadmin** ENTER. The following menu appears:

```
                File System Maintenance

Type        1 to do daily backup,
            2 to backup all files,
            3 to get a backup listing,
            4 to restore a file,
            5 to restore a hard disk,
            6 to check a file system,
            q to quit

          > Enter Number:
```

2. Type **3** ENTER to verify that the diskettes you are about to restore to hard disk are the latest backup.

   Note: If you have made a daily backup since the last periodic backup, first restore the periodic backup and then restore the daily backup.

3. The screen shows:

```
PRODUCE BACKUP LISTING
Insert first disk in drive zero, then press <ENTER>
```

4. After you press ENTER, the screen briefly displays the following:

```
LIST IS IN /tmp/backup.list
```

   Then the File System Maintenance menu reappears. To list the file contents and date of the backup, type **q** ENTER to quit.

5. At the root prompt, type:

   more /tmp/backup.list ENTER

6. When you have verified the date and contents, at the root prompt type **/etc/sysadmin** ENTER. The menu appears again. To restore a file, type **4** ENTER. The screen shows:

```
RESTORE FILE(S)

DRIVE DIRECTORY
hd0 on /

Enter directory name from above list (or /)
(Directory name must begin with "/")

Enter Pathname of Files to Restore.
If a directory is specified, all files in it will
be restored.
Type one name per line, blank line to terminate

Enter Pathname:
```

7. When you have entered all pathnames, press [ENTER] at the prompt. The screen shows:

```
These files will NOT be restored with numbers as
names, that is, they will be restored to their
correct places.

Restore from which floppy drive (0-3)?
```

8. You must type **0** [ENTER] in response to this prompt. Then answer the succeeding prompts and follow the instructions exactly as they appear on your screen by inserting Backup Diskette 1 and specifying the volume (diskette) number. When all files have been restored to the hard disk, XENIX returns to the File System Maintenance menu.

9. Type **q** [ENTER] to quit.

restoring an entire system

To restore an entire system of files to hard disk, follow the above procedures, but at Step 1, select 5.

1. The screen shows:

```
RESTORE A HARD DISK

Restore which hard disk (0-3)?
```

2. Type **0** [ENTER]. The screen shows:

```
Restore from which floppy drive (0-3)?
```

3. Type **0** [ENTER] again and the screen shows:

```
Type 1 if disks are single sided, 2 if double sided:
```

4. Type the number corresponding to the type of diskettes you are using and [ENTER]. The screen shows:

```
Insert disk in drive 0, then press ENTER:
```

5. Insert Backup Diskette 1 and press [ENTER]. After a brief time, the screen shows:

```
Mount desired dump volume: Specify volume#:
```

Type **1** [ENTER]. When the restoration is complete, the File System Maintenance menu reappears.

6. Type **6** [ENTER] to check a file system. If problems are encountered during the check, the system tells you and awaits your input. If the check is satisfactory, you are returned to the menu.

7. Type **q** [ENTER] to quit.

restoring a primary hard drive with 1 floppy drive

To restore a file or an entire system to a primary hard disk when you have only 1 floppy disk drive, first install the Core. (See Chapter 1 for instructions.) Now log in to XENIX as root.

1. At the root prompt, type:

   /etc/sysadmin [ENTER]

2. The File System Maintenance menu appears on your screen. From this point on, follow the instructions given above in "Restoring a Secondary Hard Disk with 1 or 2 Floppy Drives."

9

another way to back up and restore

Sometimes you want to back up only a single file or a few files and directories. XENIX lets you do this quickly with a program called **tar**. You, as System Administrator, can use tar to copy your own files or those of any user. A user can also use tar, but only to copy those files to which he or she has access.

You can also use tar to restore files and directories.

In the following example, you back up and restore the namelist file you created earlier.

backing up with tar

1. Log in as root. Insert a formatted floppy diskette into Drive 0, and type:

   tar cvfk /dev/rfd0 *number of bytes* namelist ENTER

   cvfk is the command variant; **/dev/rfd0** specifies that files are to be copied onto the diskette in floppy Drive 0. If you are using a single-sided diskette, the number of bytes is 1216. If you are using a double-sided diskette, the number of bytes is 2448. The *r* preceding fd0 tells XENIX to copy raw data, which is a faster way to copy. You can copy several files or directories at the same time. Simply space between each name. If you use a directory name, tar copies everything below that name in the hierarchy.

2. When the file is copied, the screen shows:

   ```
   a namelist x tape blocks
   ```

   The letter *a* indicates that the file has been added. *x* is the number of tape blocks.

restoring with tar

1. Place your backup floppy diskette in Drive 0 and type:

   tar xvf /dev/rfd0 namelist ENTER

   xvf is the restore command variant.

2. When the file is restored to hard disk, the screen shows:

   ```
   x namelist, x bytes, x tape blocks
   ```

10

printing

With XENIX you can print a file you created in XENIX, you can print a file you created with an applications program, and you can create text and print it immediately. You print using the XENIX command **lpr**.

from the console

You can log in either as root or as user to print from the console. Log in now as user.

printing a file

First, print the namelist file you created earlier.

1. At the prompt, type:

   lpr phonebook/namelist ENTER

2. The namelist file prints on your line printer. When it is finished, your user prompt appears on the screen.

XENIX automatically prints 66 lines per page.

Note: You can print a file you create with an applications program by following the above instructions. Be sure to enter the filename correctly.

printing text

You can use XENIX as a kind of typewriter; that is, you can enter text and print it on your line printer. When you enter text in this way, however, you do not create a file. For this example, write a memo.

1. At your user prompt, type:

   lpr ENTER

2. Now type anything you want. End each line by pressing ENTER. When your memo is complete, type CTRL **d**, and your memo is printed on your line printer.

from a terminal

If you have a line printer connected to a terminal, from the terminal you can print on its line printer or you can print on the system line printer.

using the system printer

To print on the system printer, at the user prompt, type:

lpr *filename* ENTER

XENIX places the file in the system spooler and prints it on the system printer when it is available.

XENIX automatically prints 66 lines per page.

using the "local" printer

The local printer is the one connected to a terminal.

If any of your users have a DT-1, it must be modified before it can be used for local printing. Consult your Radio Shack Computer Center representative about this modification.

If any of your users have a DT-100, it needs a Tandy DT-100 Terminal Interface (Cat. No. 26-1198) before it can be used for local printing.

Before doing local printing from a terminal, be sure the printer is properly connected and that it is online. To print locally, type:

local lpr *filename* ENTER

If the printer does not start or if it stops during printing, check the printer before pressing any key. If the printer goes offline, the system waits for it to come back online. Correct the problem that caused the printer to go offline and place the printer back online. The printer then continues from the point at which it went offline.

Warning: While doing local printing, do not press any key on the keyboard unless your terminal screen displays a message asking you to do so. Do not attempt to terminate the printing process by pressing BREAK or any other key. Inadvertently pressing a key may cause extra characters to be printed on the printer and may cause the printer, the terminal, or both to end processing.

XENIX automatically sets the length of the printed page to 66 lines. To change the page length for a specific printing, type:

local lpr -F "p=*x*" *filename* ENTER

-F tells XENIX that you want to change the "form." for ***x***, substitute the number of lines you want per page.

If a user wishes to be able to print locally all the time, you can add the following line to the user's .profile file:

PRINTER=local;export PRINTER

Now, when the user logs in, he or she is set to do local printing and need not use the local command to do so. Using lpr means printing on the local printer.

Note: To use local printing with applications programs, see the instructions in the manual that comes with the program.

11

using ed

When you add terminals to your multiuser XENIX system, you will need to edit, or change, some existing files. To do this, you use the line editor, ed.

In this chapter, you learn how to use ed.

creating a file

1. Log in as a user and at the prompt, type:

   ed ENTER

   Your screen now shows the ed prompt, the asterisk (*).

2. At the prompt, type **a** ENTER, and you are ready to begin entering, or appending, text. Type:

   And Olaf who on bended knee ENTER
   Did almost ceaselessly repeat: ENTER

   (If you know the rest of this quote, you can also enter it.)

3. When you are through entering text, type ENTER to end the last line. At the beginning of the next line type a period (.) and ENTER. The screen again shows the ed prompt (*). The period tells ed that you have finished appending.

   While you are entering text, it is kept in a special work space called a "buffer." To save this text as a file, at the ed prompt type:

   w Olaf ENTER

4. The **w** copies the file and saves it as a file named "Olaf." Your screen shows 59, the number of characters in the file Olaf.

5. Now end, or quit, your editing session. At the ed prompt, type:

   q ENTER

   Your screen now shows the user prompt.

displaying the contents of the editing buffer

1. To reenter the editor and to see the contents of the file you just created, type:

   ed Olaf ENTER

2. **ed** displays:

   ```
   59
   ```

3. To display the contents of the file, type:

   1,$p ENTER

4. The screen shows:

```
And Olaf who on bended knee
Did almost ceaselessly repeat:
```

   (Did you complete the quote? If so, your third line also appears!)

   Typing **1,$** tells ed to start displaying at Line 1 of the text and to display through to the last line ($). To display only the last line, type:

   $ ENTER

   To display any single line, type the line number and ENTER. You need not type p.

5. You can move back and forth among lines quickly by typing either a plus (+) or a minus (–) and ENTER. A plus displays the next line in the file, and a minus displays the previous line. To display the current line, type a period and ENTER.

substituting text in the editing buffer

You can delete portions of a line and substitute other letters or words. For example, let's change the word "ceaselessly" to "unceasingly" in Line 2 of the Olaf file.

1. Type:

   2s/ceaselessly/unceasingly/ ENTER

2. To verify that the substitution was made, type:

   p ENTER

   The screen shows:

```
Did almost unceasingly repeat:
```

   In Step 1, **2** is the line number, and **s** tells ed to "substitute." The text to substitute for and the text to substitute are separated by slashes.

deleting text from the editing buffer

You can delete a portion of a line, or you can delete an entire line or several lines.

deleting a portion of a line

1. You use the **s** command to delete only part of a line, that is, a character or a string of characters. For example, delete the word *Olaf* from Line 1 of the file Olaf. Type:

   1s/Olaf// ENTER

2. Now display the line. Type:

   1 ENTER

   The screen shows:

```
And  who on bended knee
```

deleting lines

1. You use the **d** command to delete a single line or several lines. To delete Line 2 from the file Olaf, type:

   2d ENTER

2. Display the contents of the file to verify that Line 2 is deleted. Type:

   1,$p ENTER

3. The screen shows:

```
And  who on bended knee
```

Note: To remove the entire contents of a file you create with ed and write to a file, you use the rm command. See Chapter 5 for instructions.

12

setting up terminals

Your Tandy XENIX system consists of 1 computer and as many as 5 terminals. As System Administrator, you are responsible for connecting the terminals to the computer, installing the terminals, and making users.

In this chapter are instructions for connecting the DT-1 and the DT-100 to any of the following computers: Enhanced Model II, Enhanced Model 12, Model 16, Model 16b, and Tandy 6000.

DT-1

To connect the DT-1 to your computer you need 2 items—a DB-25 Cable (Cat. No. 26-44Ø3) and a Null Modem Adapter (Cat. No. 26-1496). Before you begin, be sure that your system is shut down properly and that the computer and all peripherals are off. Connect the DT-1 according to the instructions in *Data Terminal Owner's Manual*.

connecting the DT-1 to your computer

1. Connect one end of the DB-25 Cable to the RS-232 jack in the DT-1.
2. Connect the other end of the cable to the female plug of the null modem adapter.
3. Connect the male plug of the adapter to Serial Channel A or B of your computer.
4. If your computer requires it (see the owner's manual), insert a terminator plug into the unused serial channel.
5. Now power up your hard disk, your computer, and the DT-1.

setting input-output parameters for the DT-1

Before using the DT-1 with your computer, you must be sure the DT-1 is using the appropriate Input-Output parameters. To do this, you must be at the keyboard of your DT-1.

1. To display the Input-Output parameters menu, type:

   CTRL SHIFT ENTER

2. The screen shows:

```
                SET-UP

TC1  TC0  EM1  EM0  REV  DTR  DSR  DCD
 0    0    0    0    0    1    1    1

STB  O/E  PAR  WDL  BR3  BR2  BR1  BR0
 0    0    0    0    0    1    0    0

               ALF  AWP  F/H  CT1  CT0
                1    1    0    1    0
```

3. The cursor is positioned below **TC1**. Change the pattern of 0's and 1's to the following. As you change a character, the cursor moves to the next character. To move around the screen otherwise, use the arrow keys.

```
0 0 1 0 0 0 1 0
0 0 0 0 1 0 0 1
      0 1 0 0 1
```

4. After you type the last **1**, press [ENTER]. The DT-1 asks if you want to store the parameters permanently. Press **Y**. The screen shows:

```
SET-UP STORED
```

5. To leave the Set-Up Mode, type:

   [CTRL] [SHIFT] [ENTER]

   The menu leaves the screen, the buzzer sounds, and the cursor returns to home position. Your input parameters are stored permanently. Each time you power up your DT-1, it uses these parameters

   For further information about Input-Output parameters, see *Data Terminal Owner's Manual*.

enabling the DT-1

Before you can use the DT-1, you must enable it. Return to the keyboard of your computer and log in as root.

1. If you connected the cable to Serial Channel A, type:

   enable tty01 [ENTER]

2. If you connected the cable to Serial Channel B, type:

   enable tty02 [ENTER]

   Create a user directory and a password for the person who is to use this terminal and it is ready to access XENIX. (See Chapter 3 for instructions.)

DT-100

To connect the DT-100 to your computer you need 2 items—an RS-232 Cable (Cat. No. 26-1495) and a Null Modem Adapter (Cat. No. 26-1496). Before you begin, be sure that your system is shut down properly and that the computer and all peripherals are off. Connect the DT-100 according to the instructions in *DT-100 Data Terminal Quick Reference Guide*.

connecting the DT-100 to your computer

1. Connect one end of the RS-232 cable to the DT-100 modem jack.
2. Connect the other end of the cable to the female plug of the null modem adapter.
3. Connect the male plug of the adapter to Serial Channel A or B of your computer.
4. If your computer requires it (see the owner's manual), insert a terminator plug into the unused serial channel.
5. Now power up your hard disk, your computer, and the DT-100.

installing the DT-100

Included with your DT-100 is a diskette you use to install the terminal. You must transfer the information on this diskette to the hard disk at the computer.

1. Log in as root, and at the root prompt, type:

   install [ENTER]

2. The screen shows the following Installation Menu:

```
Installation Menu

     1.  to install
     q.  to quit

Please Select:
```

3. To install the DT-100, type:

   1 [ENTER]

4. The screen shows:

```
Insert diskette in Drive 0 and press <ENTER>
```

5. Insert the installation diskette in Drive 0, close the drive door, and press [ENTER]. The screen then shows the name of the installation, the version number, and the catalog number. When the installation is complete, the screen shows the following message:

```
Installation complete--Remove the diskette, then press
<ENTER>
```

6. Remove the diskette, press [ENTER], and the screen returns to the Installation Menu. Type **q** [ENTER] to quit. Your login prompt appears.

telling XENIX your terminal type

In XENIX is a file called **/etc/termcap**. It contains some codes that identify various terminals. Your computer is automatically set to let you connect and use a maximum of 5 DT-1 terminals. When you connect and install another terminal, you must identify that terminal to XENIX.

The code for your DT-100 is dt100. You let XENIX know your terminal type by listing it in a file called **/etc/ttytype**. To do this you use the XENIX line editor **ed.** (For a quick review of ed, see Chapter 11.)

1. At the root login prompt, type:

   cat /etc/ttytype [ENTER]

2. The screen shows the following:

```
trs16 console
adds25 tty01
adds25 tty02
adds25 tty04
adds25 tty05
adds25 tty06
```

trs16 is your computer, or the console. **adds25** is the code for the DT-1 terminal. To identify your DT-100, you must change **adds 25** to **dt100**.

3. Now use ed to change this line. Type:

ed /etc/ttytype ENTER

The screen shows the number of characters in this file.

4. Type:

2s/adds25/dt100/ ENTER
w ENTER

The screen shows the number of characters in the file as it now exists after being edited.

5. Type **q** ENTER and your login prompt returns to the screen. XENIX knows that you are installing a DT-100.

enabling the DT-100

1. If you connected the cable to Serial Channel A, type:

enable tty01 ENTER

2. If you connected the cable to Serial Channel B, type:

enable tty02 ENTER

Create a user directory and a password for the person who is to use this terminal, and it is ready to access XENIX. (See Chapter 5 for instructions.)

disabling terminals

At times, you may need to disconnect a terminal. Before doing so, disable it.

If the terminal is connected to Serial Channel A, at the root prompt type:

disable tty01 ENTER

If the terminal is connected to Serial Channel B, at the root prompt type:

disable tty02 ENTER

setting up remote terminals

If you connect terminals to the computer with cables, as many as 5 terminals in the same location (room, floor, building) can use the same XENIX system. If you connect a computer and terminals with a modem, terminals at a distance (in another building, town, state) can use the same XENIX system via telephone lines.

Connect the modem following the instructions in the manual that comes with the modem. Now you must inform XENIX that you are operating from a remote

location, and you must set the baud rate so that it is compatible among computer, modem, and terminal.

setting up the DT-1 for remote use

1. At the computer, log in as root and edit the file **/etc/ttys**. To do so, type:

   cat /etc/ttys ENTER

2. The screen shows:

```
1hsconsole
09tty01
09tty02
09tty04
09tty05
09tty06
```

3. You must change the 9 in Column 2 to a 3 in the line that identifies the terminal you are setting up for remote use. For example, to set tty01 for remote use, type:

   ed /etc/ttys ENTER

4. The screen shows the number of characters in this file. Now type:

   2s/09/03/ ENTER

5. The screen shows:

```
03tty01
```

6. Now type:

   w ENTER

7. The screen shows the number of characters in the edited file. Type **q** ENTER and your prompt returns to the screen.

8. Now enable tty01. Type:

   enable tty01 ENTER

9. At the DT-1 you must now set the Input-Output parameters to correspond with the baud rate of your modem. For instructions, see "Setting Input-Output Parameters for the DT-1," earlier in this chapter.

   If you are using 300 baud, set the Input-Output parameters to the following pattern:

```
0 0 1 0 0 0 1 0
0 0 0 0 0 1 0 0
      0 1 0 0 1
```

   If you are using 1200 baud, set the Input-Output parameters to the following:

```
0 0 1 0 0 0 1 0
0 0 0 0 0 1 1 0
      0 1 0 0 1
```

10. Now when you log in to XENIX, the system switches between 1200 and 300 baud until it receives a rate that is compatible. Your screen may show "garbage," a configuration of random characters. If this happens, press ENTER. If your screen shows garbage again, press BREAK until the login prompt appears.

setting up the DT-100 for remote use

Connect the modem following the instructions in the manual that comes with the modem and the instructions in *DT-100 Data Terminal Quick-Reference Guide*. Install the terminal and edit the **/etc/ttytype** file. (See the instructions above under "Telling XENIX Your Terminal Type.") Now edit the **/etc/ttys** file to let XENIX know you are setting up the terminal for remote use. (See the instructions above under "Setting Up the DT-1 for Remote Use.")

The DT-100 parameters are set up by default to be compatible with XENIX. See *DT-100 Data Terminal Quick-Reference Guide* for instructions on how to select these default parameters.

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communicating with users

As System Administrator you frequently want to communicate with users on your system. You may wish to inform them that you are about to shut down the system, or you may need to relate other information, such as announcements or reminders. XENIX lets you do this with **/etc/motd** (message of the day) or with **wall** (write all). If you are connected to a terminal by modem, you can also send messages and transfer files with a utility called **cu**.

/etc/motd

If you place information in the message-of-the-day file, the screen displays it whenever a user logs in. You use **ed** to write in this file.

1. Log in as root and type:

   ed /etc/motd ENTER

2. Your screen shows the number of characters in the file and the ed prompt (*). (If the file contains information, delete it before writing a new message of the day.) To write a new message, type:

   a ENTER
   Today is Beethoven's birthday. ENTER
   The Tandy String Quartet will present ENTER
   the Opus 18 quartets in the 9th floor ENTER
   Conference Room, beginning at 4:00 PM. ENTER
   A wine and cheese hour will follow. ENTER
   Everyone is invited. ENTER
   . ENTER

   Your screen now shows the ed prompt. Type:

   w ENTER

   Your screen shows the number of characters in the file and the ed prompt. Type:

   q ENTER

3. Now, whenever users log in, this message appears just before their login prompt.

wall

wall connects you immediately with all users on the system. You should use it only in an emergency since it interrupts whatever is occurring at the time. It is a handy

tool, however, for notifying users of a critical situation, for example, a shortage of disk space.

1. To use **wall**, log in as root and type:

   wall [ENTER]
   Shortage of available disk space. [ENTER]
   Please clean up files quickly. [ENTER]
   [CTRL] **d**

2. Notice that you end your message by typing [CTRL] **d**. The screen shows:

```
Broadcast message from root
Shortage of available disk space.
Please clean up files quickly.
-- from root
#
```

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communicating with other systems

cu is a XENIX utility that lets you communicate with other systems. The systems can be connected manually, that is, by cable, or they can be remote, that is, connected via modem.

Regardless of how the systems are connected, you must disable the channel you are using (tty01 or tty02) before you call up another system. When you are through using cu, enable the channel so that you can be reached by others calling in.

calling up a manually connected system

If you are connected to another system by cable, you use the following command to call up the system:

cu –s *baud rate* –l *line* dir

The baud rate must be the same for both the sending and the receiving devices. The possible baud rates are:

300, 600, 1200, 2400, 4800, 9600

line is the channel to which the cable is connected at your terminal. If you are connected via Channel A, replace *line* with /dev/tty01. If you are connected via Channel B, replace *line* with /dev/tty02.

dir indicates that a modem is not in use.

calling up a remote system

To use cu to call up a remote system, you must know the baud rate of your modem and that of the modem you want to access. The baud rate for sending and receiving must be the same.

If your modem does not have the capability of automatically determining the baud rate at which you are sending, you use the following command to call up the other system:

cu -s *speed phonenumber* ENTER

speed is the baud rate (either 300 or 1200), and **phonenumber** is the telephone number of the system you wish to reach.

If your modem does have the capability of automatically determining the baud rate at which you are sending, you use the following command to call up the other system:

cu -s *speed* -l *line* -a *acu phonenumber* ENTER

speed is the baud rate (either 300 or 1200).

line is /dev/cul0 if you are connected through tty01; **line** is /dev/cul1 if you are connected through tty02.

acu is one of the following:

If you are connected through tty01 and the baud rate is 300, **acu** is /dev/cua0.300.

If you are connected through tty01 and the baud rate is 1200, **acu** is /dev/cua0.1200.

If you are connected through tty02 and the baud rate is 300, **acu** is /dev/cua1.300.

If you are connected through tty02 and the baud rate is 1200, **acu** is /dev/cua1.1200.

For example, if you are connected through tty01 and wish to call up a system with the phone number (609) 924-0865 and using the baud rate of 1200, type:

cu -s 1200-1/dev/cul0 -a /dev/cua0.1200 609 9240865 ENTER

using cu

If you wish everyone on your system to be able to use cu, edit the device file that corresponds to the serial channel you are using for cu to include read and write permissions for everyone. See Chapter 6 for instructions on how to set and change permission settings.

You can use cu to access a network, call up a bulletin board, or communicate with a terminal on another system. You do not use it to communicate with users on your XENIX system.

After you connect, cu runs as two processes—send and receive. You communicate by transferring files between 2 systems. The send process reads what you type at the keyboard, or a file you previously created, and passes it to the other system. The receive system reads what is transmitted from the other system and displays it on your screen.

If you are connecting to a bulletin board or a network, after you connect and log in you follow the communications protocol established by the system you are calling.

If you wish to communicate with a terminal on another XENIX system, you can use the procedure that follows. The procedure for initiating and terminating communication with cu is the same regardless of the device you wish to access.

sending and receiving messages

1. After you type the cu command, the screen displays a message that you are

connected. Press [ENTER] and log in at the prompt. To send a message, at the cu prompt type:

cat >/dev/tty*xx* [ENTER]
You can now type the message [ENTER]
you want to send. Be sure to [ENTER]
end each line you type by pressing the [ENTER]
<ENTER> key. To end a message, type [ENTER]
<CTRL> d at the beginning of a new line. [ENTER]
[CTRL] **d**

2. After you type [CTRL] **d**, the other system's prompt appears on the screen. To exit cu, type:

   [ENTER] **~.** [ENTER]

   Note: To obtain the tilde (~), type [CTRL] **6**.

3. Now your screen shows your XENIX login prompt.

When you use cat to send a message, that message immediately appears on the receiver's screen if the system is in use. If the receiver wishes to respond, he or she does so using the cat command as shown in Step 1 above. If the receiver does not wish to respond, he or she can ignore the message and continue with whatever task was at hand.

transferring files

You can use cu to communicate with another XENIX system and with a non-XENIX system. You can transfer files, however, only between 2 XENIX systems. You cannot use the following commands unless both systems are operating with XENIX.

When you transfer a file with cu, you simply copy it onto another XENIX system. You can copy it with the same name or with another name. To copy a file, you must be in the directory where the file exists.

To copy a file from your system to another XENIX system, at the other system's prompt type:

~%put *filename* [ENTER]

This command copies a file from your system to the other system; its name remains the same on both systems. If you wish to copy it and rename it on the other system, type:

~%put *filename newfilename* [ENTER]

To copy a file from another system onto your system, type:

~%take *filename* [ENTER]

To copy a file from another system onto your system and rename it on your system, type:

~%take *filename newfilename* [ENTER]

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adding file systems

As you work with your XENIX system, you may find that you need more space than is available on the primary hard disk. XENIX notifies you when the primary hard disk is full by displaying the following message:

```
No space on dev1/33
```

You can then decide whether to delete some files or to create additional file systems. If you want additional file systems, you can create them either on floppy diskettes or on an additional hard drive.

creating file systems on floppy diskettes

1. Format the diskettes you need according to the instructions in Chapter 4.
2. Now you can create a file system on the diskette. If you have just completed formatting, press the reset switch. Now, insert a formatted diskette in Drive 0, boot up the system, and log in to XENIX as root.
3. At the root prompt, type:

   makefs ENTER

4. Your screen shows the following menu:

```
                Make a File System on . . .

Type            1 a single-sided floppy
                2 a double-sided floppy
                3 a hard disk
                q to quit

              > Enter Number:
```

5. Type **1** ENTER if you are using single-sided diskettes; type **2** ENTER if you are using double-sided diskettes. The screen shows:

```
On which floppy Drive (0-3)?
```

6. Type **0** ENTER. The screen shows:

```
Insert formatted disk in Drive 0 and press <ENTER>
```

7. When the file system is created, the screen shows:

```
Press <ENTER> to continue
```

   The menu reappears on your screen. If you do not wish to create another file system, type **q** ENTER. Your root prompt returns to the screen.

8. Before you can access your new file system, you must mount it. That is, you must attach it electronically to your original XENIX file system. XENIX has a

special directory for this called **/mnt**. To mount your new file system, type:

/etc/mount /dev/fd0 /mnt ENTER

9. Your new file system is ready to use, and you can work on it just as you do on the original file system on your hard disk.

10. When you are through working on your new file system, you must unmount it before removing it from the drive. To do so, at the root prompt type:

/etc/umount /dev/fd0 ENTER

Note: If you use the **shutdown** command to halt the system, your files are automatically unmounted.

creating file systems on secondary hard disks

Connect the hard disk to the computer according to the instructions that accompany the hard disk. Then, power up your computer and format the hard disk. Follow the format instructions in Chapter 1. Be sure to enter the track and head information from your Media Error Map as instructed. If this is your second hard disk, XENIX refers to it as Hard Disk 1. Be sure to enter it as such when XENIX asks for the hard drive number during formatting.

1. When the format is complete, press the reset switch, and log in to XENIX as root. At the root prompt, type:

makefs ENTER

2. The screen shows the following menu:

```
        Make a File System on . . .

Type    1 a single-sided floppy
        2 a double-sided floppy
        3 a hard disk
        q to quit

      > Enter Number:
```

3. Type **3** ENTER. The screen shows:

```
On which hard drive (0-3)?
```

4. Type **1** ENTER. The screen shows the following:

```
Disk has xxx cylinders.
Disk has x heads.
Disk has xx tracks reserved for bad track mapping.
Making a file system of xxxxx blocks on /dev/hd1.
```

5. When the file system is created, the screen shows:

```
Press <ENTER> to continue
```

6. Press ENTER, and the menu returns to the screen. At the menu, type **q** ENTER, and your root prompt reappears.

7. To mount your secondary hard disk, type:

mkdir /hd1 ENTER
/etc/mount /dev/hd1 /hd1 ENTER

Your secondary hard disk must be mounted before you can acccess and use it. If you will be using it regularly, you can edit the **/etc/rc** file to include **mount**. Then it is automatically mounted when you boot up XENIX.

To do so, add the following line to the /etc/rc file:

/etc/mount /dev/hd1 /hd1

8. In most cases, you will use the secondary hard disk regularly and will not want to unmount it. You must unmount it, however, before doing File System Check. (See "Restoring a Primary Hard Disk with 2 or More Floppy Drives" in Chapter 8.)

   To unmount, type:

   /etc/umount /dev/hd1 ENTER

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maintaining the file system

As System Administrator, you are responsible for monitoring disk space and for ensuring the consistency of files. Maintaining adequate disk space and consistent, or "clean," files is essential to an efficient system. When the disk runs out of space, your system can no longer function. If your file system is inconsistent, or "dirty," you can lose files or even bring your system to a halt.

Checking disk space and files is part of your regular routine as System Administrator.

checking disk space

XENIX reports disk space in blocks. A 15-megabyte hard disk has 31212 blocks; a 35-megabyte hard disk has 69632 blocks. A minimum of 2057 blocks is always reserved as a "swap" area. XENIX uses this space to temporarily store information on running programs. We recommend that you always keep 15% of your blocks free.

With this information and some simple arithmetic, you can arrive at the maximum number of blocks to use. For example, if you have a 15-megabyte hard disk, you can use 24474 blocks.

You find out about disk space, number of files, and who has access to them by asking XENIX.

how much disk space is free?

1. To find out how many blocks are free on your root file system, or your primary hard disk, at the root prompt type:

   df ENTER

2. Your screen shows:

   ```
   /      (/dev/root): xxxxx blocks xxxx i-nodes
   ```

   Of course, the number will reflect the blocks available on your particular system.

3. To find out how many blocks are free on your secondary hard disk, type:

   df /dev/hd1 ENTER

4. Your screen then shows the number of available blocks.

how many blocks are allocated to what files and users?

1. To find out specific information about how many blocks are owned by each user on a particular disk, type:

   quot –f /dev/hd0 ENTER

   Note: In this case, you are asking about the primary hard disk (hd0).

2. Your screen shows something similar to the following:

```
/dev/hd0:
8486   673   bin
4654   148   root
 651    77   sys
  38    29   pat
   3     3   donna
   2     2   bc
```

   The number in Column 1 is the total number of blocks for the file. The number in Column 2 is the number of files. Column 3 identifies the login name of the owner.

how many blocks are used by individual directories?

1. To find out how many blocks are being used by everything below your current directory, type:

   du ENTER

   The screen shows a list of directories, subdirectories, and files and the number of blocks used by each as well as a subtotal of individual directories.

2. You can also specify a directory. When you need more space on the hard disk, it is helpful to know what user files are consuming how many blocks. Then, if they are not essential, you can delete them and have more available space. For example, to find out how many blocks are in /usr/pat, type:

   du /usr/pat ENTER

3. Your screen shows something similar to the following:

```
4    /usr/pat/scripsit
3    /usr/pat/projects
1    /usr/pat/schedule
2    /usr/pat/bc
12   /usr/pat
```

   Column 1 shows the number of blocks, and Column 2 shows the pathname.

checking files

When you boot up XENIX, you may see a message saying that the file system needs cleaning. XENIX also asks if you want to clean the system. You always respond yes. Then XENIX runs a program called **fsck** (file system check).

Inconsistent files can result from shutting down the system improperly or from hardware problems such as a faulty drive. If you suspect file problems, you can run **fsck** yourself. Before doing so, be sure that no one else is using the system or accessing files.

1. To check the files on your secondary hard disk, log in as root and at the root prompt, type:

   fsck –y /dev/hd1 ENTER

2. Your screen shows each of the 5 checking phases and then reports the number of files, the total number of blocks, and the number of free blocks as follows:

```
/dev/hd1
** Phase 1 - Check Blocks and Sizes
** Phase 2 - Check Pathnames
** Phase 3 - Check Connectivity
** Phase 4 - Check Reference Counts
** Phase 5 - Check Free List
xxxx files xxxx blocks xxxx free
```

   XENIX then tells you if the root structure was "okay" or if the file system has been modified.

monitoring processes

Functions of the XENIX system—for example, editing, printing, copying—are known as "processes." On your XENIX system you and your users can run several processes at the same time. It is frequently helpful to know what processes are currently running.

1. To find out what processes are running at your console or terminal, at the root prompt type:

   ps ENTER

2. To find out what processes are running on an entire multiterminal system, at the root prompt type:

   ps -e ENTER

3. Your screen shows a report similar to the following:

```
PID   TTY   TIME   COMMAND
  2   co    1:07   -sh
 73   01    2:09   tsh
 74   01    0:10   sh -c ps-e
 77   co    0:59   ps -e
```

   PID is the process identification number, which XENIX generates and uses. **TTY** is the terminal running the process (co is the console, or host computer). **TIME** is the total time the process has been running. **COMMAND** is the name of the process's command or program.

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what to do if . . .

Following the instructions in this manual will help to ensure that your system runs smoothly and functions efficiently. On occasion, however, you will encounter problems. This chapter lists some of the more common ones and what you can do about them.

your printer jams

Your printer will come to a halt if it needs a new ribbon or if the paper is not feeding properly. If it should stop, however, and neither of these is the reason, try the following procedure.

1. Log in as root. To find out what processes are currently running on the system, including invisible processes that XENIX itself is running, type:

   ps -ef ENTER

2. Your screen might show the following:

```
UID   PID  PPID   C      STIME    TTY   TIME  COMMAND

root    0     0  12       Dec 31     ?  0:00  swapper
root    1     0   0       Dec 31     ?  0:01  /etc/init
root   35     1   0    15:21:12    co  0:03  -sh HOME</ PATH<:/
                                              bin:/usr/bin
root   41    35  24    15:23:57    co  0:02  ps -ef
root   20     1   0    15:21:01     ?  0:00  /etc/update
root   29     1   1    15:21:08     ?  0:00  /etc/cron
cron   32     1   0    15:22:00    co  0:00  /usr/lib/lpd
```

   The last column indicates that one of the processes currently running is the line printer daemon. Its identification number is 32, and it is running on the console, or host computer.

3. To "unjam" the printer, you need to kill the process, move to the printer file directory, and "unlock" the printer. To do so, type:

   kill -9 32 ENTER
   cd /usr/spool/lpd ENTER
   rm -f lock ENTER

4. Now type:

   /usr/lib/lpd ENTER

   The printer should begin to operate. In all probability, the printer will begin printing the file it was printing when the jam occurred.

you forget your root password

If you as System Administrator forget your root password, you must reinstall XENIX.

a user forgets his or her password

The user can select another password, and you, logged in as root, can change the password. See Chapter 3 for instructions.

the system runs out of space

You can delete some files and make more space (see Chapter 5), or you can create new file systems on another hard disk or on floppy diskettes (see Chapter 15).

your file system is damaged

You can restore the file system from your backup library. See Chapters 8 and 9 for instructions.

you lose the screen display

Occasionally, when you press BREAK to terminate a XENIX program that has screen displays, you are unable to call anything else up on the screen. When this happens, the screen is in a "no echo," or "raw," mode. To reinstate screen display, type:

CTRL **j**

stty echo –raw CTRL **j**

Notice that you do not press ENTER at the end of these lines. If the screen shows an error message after the first CTRL **j**, type CTRL **j** again, and then type the second line. You will not see either line as you type it.

After you type the second line, whatever material you then type should appear on the screen.

you have a runaway process

A runaway process is either a process you cannot stop (a program that continues to execute) or a continuous stream of unwanted characters that appears on the screen. A runaway process can be the result of user error or electronic malfunction. In either case, you can use the following procedures, in the order given, to try to terminate the process.

1. Wait a while to see if the process will cease on its own accord, unless, of course, you know that the process is damaging files.
2. Press BREAK.
3. If you have another terminal on your system, use it to try to kill the process. At the other terminal, log in as root, and type:

   ps –e ENTER

   The screen should show the processes currently running on all terminals.

Determine the ID number of the unwanted process. At the root prompt, type:

kill –2 ***process ID*** ENTER

Wait a few seconds. If the process does not stop, type:

kill –1 ***process ID*** ENTER

Wait a few more seconds. If the process still does not stop, type:

kill –9 ***process ID*** ENTER

In all probability, this last command will stop the process. It may, however, affect the file system; so you should check the file system. (See Chapter 16 for instructions.)

4. If you are running XENIX from the console and do not have other terminals, you may have to press the reset switch to stop a runaway process. Because this is an incorrect way to shut down the system, it may cause file inconsistencies. Therefore, use it as a last resort, and then check the file system.

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important files and directories

This chapter contains listings of the most frequently used files and directories in the XENIX system. Many are required for proper XENIX operation, and you should not modify them or remove them.

the root directory

root (/) contains the following directories, which are required for system operation and should not be deleted:

/bin	XENIX command directory
/dev	device special directory
/etc	additional program and data file directory
/lost+found	storage area for orphaned files recovered by the file system cleaning program
/mnt	mount directory (reserved for mounted file systems)
/usr	user home directories
/tmp	temporary directory (reserved for temporary files created by programs)
/lib	contains system date utility

root also contains the following files, which are required for system operation and should not be deleted:

/diskutil	disk formatter program
/xenix	xenix system object code
/z80ctl	z80 control program

the /bin directory

/bin contains the commands most likely to be used by anyone on the system. The following list contains a few of these commands. All commands in this directory are required.

basename	echo	restor	su
cp	expr	rm	sync
date	fsck	sh	tar
dump	mv	sleep	test
dumpdir	passwd	stty	

the /dev directory

/dev contains special files that control access to peripheral devices, such as disks and printers. All files in this directory are required and must not be removed.

/dev/console	system console
/dev/lp	line printer
/dev/mem	physical memory
/dev/null	null device (used to redirect unwanted output)
/dev/fd*x*	floppy disk drives
/dev/hd*x*	hard disk drives
/dev/r*xx*	unbuffered interface to corresponding device name
/dev/root	root file structure
/dev/swap	swap area
/dev/tty*xx*	terminals
/dev/tty	terminal you are using

the /etc directory

/etc contains miscellaneous system program and data files. All files are required, but you may modify some of them.

The following files must not be removed or modified:

/etc/login	for accessing the system
/etc/mnttab	mounted device table
/etc/mount	for mounting a file structure
/etc/mkfs	for creating a file structure
/etc/init	first process after boot

The following files may be modified but not removed:

/etc/passwd	password file
/etc/rc	bootup shell script
/etc/ttys	terminal setup
/etc/termcap	terminal capability map
/etc/motd	message of the day

The following directory contains files that may be modified but not removed:

/etc/default	defaults for various programs

the /mnt directory

/mnt is an empty directory that is reserved for mounting removable file systems.

the /tmp directory

/tmp contains temporary files created by XENIX programs. The files are normally present when the corresponding program is running. If you terminate the program prematurely, the files may be left in /tmp. You may remove any temporary file that does not belong to a running program.

the /usr directory

/usr contains the home directories of all users on the system. It also contains several other directories that provide additional XENIX commands and data files.

/usr/bin	contains more XENIX commands, which are less frequently used or are not essential for system operation
/usr/lib	contains more libraries and data files used by various XENIX commands
/usr/spool	contains various directories for storing files to be printed
/usr/tmp	contains more temporary files. You may remove any temporary file that does not belong to a running program.
/usr/adm	contains data files associated with system administration and accounting

log files

Some directories contain log files that grow in size during normal system operation. You should truncate many of these files periodically to free disk space. (Use the command **cp /dev/null *filename*.**) Before doing so, however, be sure to take note of their contents. Some of these files can be especially useful.

For example, the /usr/adm/messages file contains a record of all error messages sent to the system console. If it shows an unusual number of disk error messages, you might suspect a defective or misaligned drive.

The following is a list of these files (by full pathname) and their contents.

/etc/ddate	date of the latest backups. Do not delete or truncate this file.
/usr/adm/pacct	accounting information
/usr/adm/messages	error messages generated by the system when started
/usr/adm/wtmp	user logins and logouts

/usr/spool/at/past is a directory that contains a file for each use of the at command. You may remove files in this directory, but not the directory itself.

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system defaults

A system default is a condition that exists within your XENIX system when you install it. For example, when you first boot the system, the root password is [ENTER]. You changed this default when you established your own root password. (See Chapter 2.)

Some system defaults you may wish to change; most, however, you will keep. Following is a summary of system defaults, the files affected, and how to change the defaults. You must be logged in as root to edit any files containing system defaults.

Note: After you edit a file to change a default, the setting you establish remains in effect until you change it again.

mkuser defaults

You use the mkuser program when you add users to the system.

group and user id numbers

The /etc/passwd file contains information about users, including login names and user and group identification numbers. XENIX automatically assigns a group number of 50 to all users on the system and sequentially assigns each user a number above 200 when you add users with the mkuser program.

If you work with more than 1 XENIX system and users want to transfer files from one system to another, then each user must have identical login names and identification numbers on every system. Each name and number must be unique.

For example, harryo has an ID number of 206 on one system. He wishes to transfer some of his files to another system, but a user on that system already has the ID number 206. harryo must choose a new ID number not in use on any system involved in his file transfers.

First, determine a unique ID number, and then edit the /etc/passwd file to change 206 to the new number. Now, you must change the user ownership of each of the user's files and directories from the old user ID to the new one. To do so, type:

chown ***user name directory or filename*** [ENTER]

Follow the same procedure to change a group ID, but use **chgrp** instead of **chown**.

.profile file

The mkuser program creates a standard .profile file for each user. You can change the parameters of this file by editing **/user/lib/mkuser.prof**. Use **ed** to do so.

drive defaults

Drive defaults concern which drives are mounted and what kind of floppy drives you are using.

mounted drives

Initially, only your primary hard disk is mounted. You can mount and unmount additional file systems as you want to use them. You can also edit the **/etc/rc** file to include a mount statement. Then a secondary hard disk system is automatically mounted when you type CTRL **d** in the boot procedure.

floppy drives

To find out the system defaults for floppy drives, at the root prompt type:

drive ENTER

Your screen should show the following:

```
drive 0: nodetect, wait, seekrate=0
drive 1: nodetect, wait, seekrate=2
drive 2: nodetect, wait, seekrate=2
drive 3: nodetect, wait, seekrate=2
```

nodetect indicates that for Drives 0, 1, 2, and 3 the door-open detection device is off. You can choose for it to be on by specifying detect instead of nodetect.

wait indicates that XENIX is to wait for the drive motor to reach proper speed before attempting to read or write to the disk in the specified drive. You can also select nowait.

seekrate=0 indicates that the speed at which the drive locates the track to read or write to is 3 milliseconds (3 ms). **seekrate=2** indicates that the speed is 10 ms. You can also set the seekrate at 6ms by specifying 1 and at 15ms by specifying 3.

We recommend the following settings for the following types of floppy drives:

Thinline	detect, wait, seekrate=0
Latch	nodetect, nowait, seekrate=3
Pushbutton	detect, nowait, seekrate=2

To change the drive settings, use the following format:

drive *number* wait | nowait detect | nodetect rate=*x*

You must type the command in this order even though when you display the drive specifications they are in a different order. For example, to change the defaults of Drive 3, type:

drive 3 nowait detect rate=0 ENTER

Now, verify that the change is made by typing **drive** ENTER.

terminal defaults

System defaults specify that you will use a console and 5 DT-1 terminals. This information is in the /etc/ttytype file. For instructions on how to change this file if you are installing a different kind of terminal, see Chapter 12.

Information on the status of terminals on your system is in the /etc/ttys file. Display this file and you see which terminals are enabled and disabled. Initially, only the

console is enabled. To enable other terminals, you use the enable command. (For instructions, see Chapter 12.)

line printer defaults

The line printer spooler produces a header page (banner) to separate sets of printer output. If you do not want the banner page, edit the file /etc/default/lpd. Change the line

banners = 1

to

banners = 0

quick reference guide to commands

This section contains a listing and a summary of all the commands in *The System Administrator's Guide to XENIX*. It also contains some commands available on the Core but not mentioned in the manual.

When using these commands, type **boldface** text exactly as it appears. Text in *italics* indicates a variable; you substitute something for the italicized text. For example, in the command **cat *filename***, you substitute the actual filename for the word *filename*.

cat concatenate, or display, text on the screen

cat *filename*
displays the contents of the file on the screen

cd change directory

cd
returns you to your login directory

cd *directory*
changes your working directory to *directory*

chmod change mode

chmod *who operation code permissions file*
changes the permissions mode for *file*

who

a	all (user, group, others)
g	group
o	others
u	user (login owner)

operation code

+	add permission
–	remove permission
=	assign all permissions (read, write, and execute)

permissions

r	read
w	write
x	execute

cp copy file

cp *filename1 filename2*
makes a copy of *filename1* and names it *filename2*

cp *filename1 filename2 directoryname*
copies 2 files into the specified directory

date displays the current date and time on the screen

df disk space free

df
displays the number of blocks free on your root file system

df /dev/*hdx*
displays the number of blocks free on the specified disk

du disk usage

du *directory*
displays the number of blocks in use on the specified directory and in what files

kill terminate a process

kill *number*
terminates the process *number*

lc list, or display, the contents of a directory and information on files in that directory

lc *directory name*
displays the contents of the specified directory

lpr line printer spooler

lpr *filename*
prints the file on the line printer

ls list, or display, the contents of a directory and information on files in that directory

ls *directory name*
displays the contents of the directory

ls -l *directory name*
displays the contents of the directory, including the names of all subdirectories and files, size, date created, and permissions

mkdir make directory

mkdir *directory name*
makes a directory

more display text on the screen, 1 screen at a time

more *filename*
displays the contents of *filename* on the screen, 1 screen at a time

mv move or rename files and directories

mv *filename1 filename2*
changes the name of *filename1* to *filename2*

mv *filename1 directory name*
moves *filename1* to the specified directory

mv *directory name new directory name*
changes the name of the specified directory

passwd change your login password

park park, or position, the read/write head of the hard drive

park -on
positions the read/write head on the last cylinder of the hard disk

park -off
positions the read/write head on the cylinder in use

ps process status

ps -e
displays information about all active processes

pwd print working directory

pwd
displays the full pathname of your working directory

quot summarize file system ownership

quot -f *file system*
displays the number of blocks and the number of files owned by each user in the specified file system

restore restores to hard disk files saved on floppy diskette

restore *floppy drive number*
restores files on the diskette in floppy Drive *n* to hard disk

rm remove files or directories

rm *filename*
removes the specified file

rmdir *empty directory name*
removes the specified empty directory

rmuser *user name*
removes the specified user

save save, or back up, files or directories

save 0 -ss /usr/*name*/*'filename'*
copies a file to the single-sided diskette in Drive 0

wall write to all users on the system

who who is on the system

who
displays a list of online users by login name, terminal, and login time

glossary

accessing. The process of getting at information stored in the computer.

applications program. A group of instructions that does a specific, practical task, such as keeping track of accounts payable.

backup. A copy of information that is stored on a floppy diskette or hard disk.

banner. A heading that separates parts of information printed on the line printer.

baud rate. The speed at which information is transmitted.

block. A set of consecutive machine instructions, characters, or digits the computer understands as a unit.

boot. The process of loading the disk operating system.

buffer. An area of a computer's memory that is used to store information temporarily.

bulletin board. In the world of computers, an electronic version of the cork type. Users exchange information by placing notices on it and responding to posted notices.

byte. The basic unit of information in the computer. A byte is the equivalent of 1 character.

cable. A device consisting of plugs and wiring that lets you manually connect computers and peripheral devices.

Central Processing Unit. The circuits in the computer that control the execution of instructions.

cleaning. In XENIX terminology, the process of clearing up inconsistencies on the file system.

command. A sequence of characters that tells the computer to take a particular action immediately. A command is usually typed at the keyboard.

communications protocol. The steps you take to get to and converse with connected electronic media.

computer. An electronic device that can receive and follow instructions and then use these instructions to calculate and to compile, select, and correlate information. It usually consists of a keyboard, a video screen, input/output devices, and a Central Processing Unit (CPU).

console. The host computer in a multiterminal system. See also host computer.

core system. In XENIX, the basic unit of the operating system that you must have to run applications programs.

CPU. Central Processing Unit.

current directory. The place in the XENIX system in which you are working.

cursor. A blinking or steady screen-symbol that indicates the place at which the next typed character will appear.

cylinder. A division of a hard disk.

data. Items of information that a computer can process or generate.

data terminal. A connection between you and a computer that transfers information from human form to a format computers understand. It consists of 3 parts—a keyboard, a videoscreen, and input/output channels.

default. A condition that exists when you turn on your computer.

development system. In XENIX, a group of programs and utilities with which you can make other programs and do typesetting and printing. It is separate from the core system.

device. Any piece of computer equipment.

directory. A list of the files on a disk. In XENIX, a disk can have multiple directories, each containing other directories and files.

disable. Disconnect or disallow electronically.

disk. A device on which a computer can store information. See floppy diskette; hard disk.

diskette. See floppy diskette.

diskutil. In XENIX, a program with which you format and/or copy hard disks or floppy diskettes.

display. The video screen. If a program displays text, it shows it on the screen. If a program prints text, it prints it on paper at the line printer.

edit. Alter, or change, text. You edit text when you add, modify, or delete portions of it.

editor. A program that lets you use specific commands to modify text.

enable. Connect or allow electronically.

error message. Text that appears on the screen that tells you a mistake has been made. It may be your mistake or the computer's.

execute permission. In XENIX, a setting that lets you run a program.

file. A defined unit of data stored on disk. In XENIX, sometimes both files and directories are referred to as files.

file system. The organization and allocation of files on disks.

floppy diskette. A flexible platter made of a plasticlike material on which the computer can store data.

format. Organize a disk into tracks so that the computer can write on it.

garbage. A random display of characters that may appear on the screen or in printed copy.

group. In XENIX, a specifically defined collection of users.

hard disk. A circular metal plate with magnetic material on both sides, on which the computer can store data.

head. A device that reads information from, writes information on, and deletes information from a disk.

hierarchical structure. In XENIX, the way directories and files are organized; that is, the way in which they branch from a single root.

home directory. In XENIX, your login directory.

host computer. The controlling computer in a multiterminal computer system.

initialize. To make a formatted disk ready for use.

input-output parameters. The electronic options for placing data into a computer or taking it out.

line printer. A device for making paper copies of the information produced by a computer.

log in. The way in which you identify yourself to the computer.

login directory. The root directory with which your login name is associated.

log out. The way in which you tell the computer you are leaving the system.

manually connected terminal. A computer or data terminal that is connected to the host computer by cable.

media error map. A list of bad, or flawed, tracks and heads that comes with your hard disk.

megabyte. 1 million bytes.

menu. A screen display that gives you a list of options.

modem. A device you connect to your computer and with which you communicate with another terminal over telephone lines.

mount. Make a device electronically or physically accessible to your computer.

multitasking. The ability of an operating system to perform several tasks at the same time.

multiuser. A computer configuration, or system design, that lets more than 1 person use the computer at the same time.

network. A series of interconnected computer communication systems.

null modem adapter. A device you connect to your computer that tells it you are connecting to another computer or data terminal manually.

operating system. A set of instructions the computer uses to do what you ask it to do. For example, the operating system controls the line printer and acts as a base for an applications program.

other. In XENIX, anyone besides a user and a group.

parameters. Information that defines the options a user supplies when a program is run.

password. A code you supply before the computer lets you use it.

pathname. In XENIX, the route, or path, the operating system takes to a specific file or directory.

permission. In XENIX, access to files and directories. You may have read, write, and/or execute permission.

permission setting. The code attached to files and directories that determines a user's access.

primary hard disk. The first hard disk you install. In XENIX, the primary disk is referred to as hard disk 0 (hd0).

printing. Making a paper copy of information produced by the computer.

process. An operating system's basic unit of activity.

program. A set of instructions that tells a computer step by step how to perform a task.

read permission. Lets you display a file on the screen and read it.

reformat. Reorganize a disk. Reformatting erases existing data.

remote terminal. A computer or data terminal connected to a computer by modem.

restore. Put information stored on floppy diskettes back onto a hard disk.

root. In XENIX, the System Administrator's login name. Also, the name of a basic directory that is required for system operation.

runaway process. A computer activity that does not stop as the program instructs or that you cannot stop manually with ease.

secondary hard disk. Any hard disk on a system other than the primary hard disk. In XENIX, secondary hard disks are identified sequentially as hard disk 1, hard disk 2, and so on.

serial channel. A port on the computer to which you make a modem or cable connection.

shell. A program that reads and interprets what you type at the keyboard.

shutdown. Closing the system to use.

spooling. The process by which data is placed in a line, or queue, to await transmission. For example, when you print a file on the line printer, the computer first places it on a waiting list, or spool, and then in its turn the file is printed.

swap area. The space on the primary hard disk where XENIX temporarily stores information on running programs.

syntax. The form of a command, including the order in which items are placed and the way in which they must be stated.

system administrator. In XENIX, the person responsible for installing, monitoring, and maintaining the system.

terminal. In common usage, a computer or a data terminal.

text. Anything other than graphics that you type at the keyboard or display on the screen.

UNIX™. An operating system developed by Bell Laboratories and from which XENIX is derived.

unmount. Disconnect or make unavailable for use.

user. In XENIX, anyone logged in to the system other than root.

utility. A program, often supplied with an operating system, that performs basic system functions such as saving and restoring files and copying files.

verify. To make certain that a comparison is correct.

volume. In XENIX, a floppy diskette.

write permission. Lets you edit a file or directory.

write-protect. A device or switch that makes it impossible to write on a disk.

XENIX. A multiuser, multitasking operating system derived from UNIX.

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